THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., OCTOBER 2, 1890.

THE WEEK IN IRON CIRCLES.

General Features. An event of far-reaching importance to the iron and steel trade of this country was the assembling, this week, in New York, of the international convention of ironmasters from Great Britain and the Continent. The gathering was not less noteworthy for its size than for the individual distinction of its members. During the next few weeks the visitors will be given a peep of the great industries of the West and South, and it is not too much to say that they will depart with new and exalted ideas of our resources. Already it is reported that several large manufacturers of tinplate have joined the party for the purpose of exploiting this country with a view to assisting in the establishment of that industry in the United States, now that the McKinley tariff bill has become a law. The various trade centers of the Central West show unabated signs of prosperity, though a temporary lull in pig iron sales is noted in some quarters. This is particularly true of Cincinnati, where the stringency in money has exercised its influence on the market in spots since our last report. Some lots of iron have been pressed for sale for immediate delivery and cash, and prices realized were about twenty-five cents per ton under the understood minimum of the market. Aside from this furnaces have held firmly, and at the close of the week large transactions took place at regular prices. The largest Southern producer has sold this month more than twice the product of its furnaces, and report that they will have all they can do between now and Christmas to fill their orders. Stocks of iron are smaller and ores and coke are less and dearer in the South. In the Mahoning Valley a good deal of iron is being carried because its high cost will not admit of selling on the present market. An attempt is being made to get a reduction on Connellsville coke, but so far without success. All rolling mills and foundries continue as busy as ever and see no sign ahead as yet of slacking in demand. The heavy consumption of iron, which has been the prominent feature of the Chicago market for a number of weeks back, still continues, many concerns being obliged to decline further business on account of inability to complete within periods specified. The amount of iron now being melted is heavier than at any previous time, and indications all point to a continuance of activity in this direction. There is a strong disposition on the part of certain furnaces which have been cutting prices to now withdraw from the market for anything in the way of of early deliveries. The Pittsburgh market continues very good indeed for manufactured iron, and very unsatisfactory for pig iron. Transactions are light and some concessions have been offered by outside brands seeking to effect sales in that market, but regular standard irons are firm at the exceedingly low prices now ruling. Considerable activity has developed during the past week at Detroit, and several deals for Lake Superior charcoal have been closed, amounting in the aggregate to several thousand tons. Prices on outside brands that are not well known have been made below what regular irons are commanding. There is quite an active demand for Jackson County silveries, and furnaces are behind in their shipments. Southern irons have also been called for quite ely, and a number of orders booked. Inquiries are being received for almost all classes of metal, and in nearly every instance prompt delivery is wanted. Owing to the great demand for cars to move the cotton and other crops there is a dearth of cars for other purposes and Southern furnaces are complaining very considerably. Some furnaces have been compelled to bank owing to lack of fuel. Prices are somewhat steadier, in keeping with the views of Southern furnaces. Consumption continues to be enormous in all branches, and in some lines manufacturers are refusing new business. Buying at Buffalo is considerably heavier, but does not seem to result in an advance in values. Many consumers are taking advantage of the extremely low prices to partially cover their present contracts in the event of a rise.

Iron Ore. There is no market, and since there is nothing to sell, there is no occasion for any activity on the part of either producers or sales agents. The only thing that is concerning the trade—and that in an indirect manner—is the lack of activity in shipping circles, in consequence of which a good many vessels are running wild, so that the quantity of ore yet to come down is a puzzle to the oldest heads. All the indications point to an earlier close of navigation than was the case last year, and a good many vessel owners who see no profit in going up light and then bringing ore down from Ashland at a dollar a ton, are likely to lay up at the end of October, or earlier yet, to save both in the fixed charges and in insurance. The opening, next year, of the Cuban mines now in the hands of local capitalists, may to a considerable extent affect the Eastern sales of Bessemers made probable this season. During the past few years there has sprung up quite a demand, east of the Alleghenies, for the best grades of the Lake Superior ores, and since the largest portion of the Spanish ores was this year taken by the English steel makers, Eastern furnacemen, whose wants are not wholly supplied by their native ores, have made advances toward this market for raw material. The Spanish mines, it is well known, are fast becoming exhausted, and if the Cuban ores recently developed can be laid down at tidewater at a fair price, the furnacemen further west are quite likely to put in a bid for all the new mines can produce. On the other hand the Central West has enormously increased its consumption of steel, so that the local market has grown along with the increase in production. The proof of this assertion is found in the fact that hardly a pound of ore has found its way, this year, over the mountains. Another encouraging feature affecting the ore market is the wholesale substitution, in many quarters, of steel for purposes for which, only a very short time ago, iron was used. So, for instance, one-half the quantity of bars that were formerly made of iron, are now produced from the Bessemer material, and the trend of the trade is continually in the direction of using steel in preference to iron. There is nothing new to report in the coke situation. The coke syndicate continues to charge what it pleases for its product, and neither furnacemen nor the foundry trade is able to procure the slightest concessions from the coke barons.

Pig Iron. The market is dull and sluggish, both as to the volume of business and price. The makers of pig metal charge this state of affairs mostly to the fact that the largest consumers are well supplied for the present, while smaller concerns that are pressed to meet their ore payments are perforce compelled to make and sell iron at whatever they can get for it, and so depress the market. However that may be, the fact remains that there is an appreciable increase in the consumption of pig iron, while the stocks are getting lower every day. The natural sequel is that the time is almost in sight when the largest consumers, who now decline to buy much iron for long future delivery, will enter the market about the same time, only to find the stocks practically exhausted, and conservative iron men say that this contingency is likely to arise any day, together with a material advance in the price all along the line. As a matter of fact, some of the leading furnace concerns, who are in a position to wait, refuse orders at present quotations, well satisfied that the near future has in store for them something of the boom that all the products of pig iron are now enjoying.

STEEL TESTS OF INTERNATIONAL SIGNIFICANCE.

The daily press has given more or less space to the recent tests of steel plates at Annapolis, under direction of the Secretary of the Navy and the Naval Board. More particular details now at hand, however, add to the significance of the results from an international point of view, and leave no doubt of the decided superiority of the French plates over the English, thus demonstrating the wisdom of American steel makers in adopting the former process rather than the latter. From various sources we compile the following account of the tests and results.

The tests were decided upon by the Secretary of the Navy, several months ago, and were to be a trial of the French armor-piercing projectile, known as the Holtzer shell, as well as of the plates. The competition was declared open to all manufacturers, but the American steel makers announced that they were not yet ready to provide plates for these tests. The plates provided were consequently all of foreign make. They were three in number. Messrs. Schneider & Company, of the Le Creusot Works, in France, furnished two of the plates, and Messrs. Charles Cammell & Company, Limited, of Sheffield, England, sent the third. One of the Creusot plates was made of solid steel, with no alloy, containing about ⅓ of 1 per cent. of carbon, and the other was made of nickel steel, an alloy of 95 per cent. of steel and 5 per cent. of nickel. Each plate cost about $3,750. The Cammell plate was a compound plate, made of two sections, the steel face, which comprised one-third of its thickness, being welded on to a wrought iron backing. All the plates were eight feet high, six feet broad, and 10½ inches thick, except the Cammell plate, which slightly exceeded that thickness. The gun used was a modern high-powered 6-inch rifle, 17½ feet in length, constructed expressly for the trial. The 100-pound Holtzer projectiles used were manufactured at Unieux, France. They were made of forged steel, with points of chrome steel, and were 17 inches long. The initial velocity, using 44½ pounds of powder, with a chamber pressure of 15 tons to the square inch, was 2,075 feet per second. The muzzle of the gun was 30 feet from the centre of each target. The plates were arranged side by side in front of a large mound of earth. They were supported by a solid wooden backing made of three thicknesses of 12-inch oak beams, braced in the most scientific manner. Each plate was held in position by two upright pieces of iron bolted to the framework.

Four shots were fired at different points on each target. The Creusot all-steel plate was penetrated a greater or less depth by each shot, but in no case was it cracked. One of the shots was imbedded, two rebounded, and the fourth, which went through the plate, was shattered. The projectiles all penetrated the nickel-steel plate with almost the same results which attended the tests of the all-steel plate. Three shots went through the plate into the backing, but the plate was not cracked. Two of the shots remained fast in the target, and two were broken up. The Cammell composition plate was shown to be utterly incapable of standing the fire. The first shot went through the plate and into 17 inches of the backing, splintering the plate around the point of entrance in a very irregular manner, and scattering fragments. The second shot penetrated still farther than the first, and, in addition, badly cracked the plate. The third shot penetrated the plate far into the backing, causing additional cracking. The fourth shot passed clear through the plate and backing, causing the steel face to peel off like wood veneering.

No unprejudiced person can fail to observe that the results of the trial were decidedly against the English plate. The real significance, therefore, of the event is found, first, in the fact that it may result in the rejection of thousands of tons of Cammell plates now ready to put on French battle-ships, and secondly, that it will stimulate the completion and enlargement of the Le Creusot process in American works. Already the Bethlehem Iron Company has given notice that a vote of its stockholders will be taken on the question of increasing its capital stock from $3,000,000 to $5,000,000, in order to enter more largely than ever into the manufacture of superior steel plate.

Another important event, growing immediately out of these tests, will be a conference between Secretary Tracy and the prominent steel-makers of the country, to be held in Washington on October 8, invitations to which have just been issued. The conference will take the form of a discussion on the needs of the naval service, and manufacturers will be asked to exchange their views and offer suggestions which may serve to enlighten the department and its officials somewhat as to the conditions under which steel suitable for their requirements is turned out. An effort will likely be made to show the department that it could economize, without sacrificing strength or durability, by changing the specifications of a good deal of the material it uses. The quality of steel at present demanded by the Government is made by but two or three firms. If the Government could be induced to use steel made by other processes, the orders for its work would be distributed over many more factories. The steel board is credited with being opposed to any change, and especially as antagonistic to recognizing the Clapp-Griffiths process. An effort, it is understood, will be made to demonstrate the equality of steel made by this process with that of the open-hearth article.

Some of our contemporaries, viewing the outcome of the above experiments, are disposed to be quite jubilant. One writer is of the opinion that the triumph of a little band of colonists over Lord Cornwallis and his red coats was scarcely more humiliating than the destruction of the Cammell plates. Another thinks it may be doubted whether in some respects this test has not a more revolutionary result than the battle between the Monitor and the Merrimac. It may be the part of wisdom to curb these glowing anticipations until Amercan-made plate demonstrates that it can withstand like tests; though the well-known enterprise of American steel-makers will, no doubt, prove equal to the emergency, when the time comes.

AMERICAN STEEL IN ENGLAND.

The announcement by a leading Pittsburgh steel firm that it will establish agencies for the sale of its product in Great Britain and Europe comes with peculiar significance on the heels of the passage of the amended McKinley tariff bill. If, to adopt the parrot-like reiterations of the tariff reformers, the tariff is a Chinese wall around our country, cutting off all foreign markets, this is a very singular illustration of the fact. The Pittsburgh firm figure that it may cost $10 a ton to ship fine steel to London, but its quality will be such as to put it on a competing basis with the foreign article. A hard nut this for the Free Trade theorist: An American firm, because of the protection which the tariff has afforded, building up its business and improving its processes until it is able to turn out the finest steel in the world, and in view of this same protection, it is also able to reach out for foreign trade because its domestic trade is thus assured. To sum it all up—

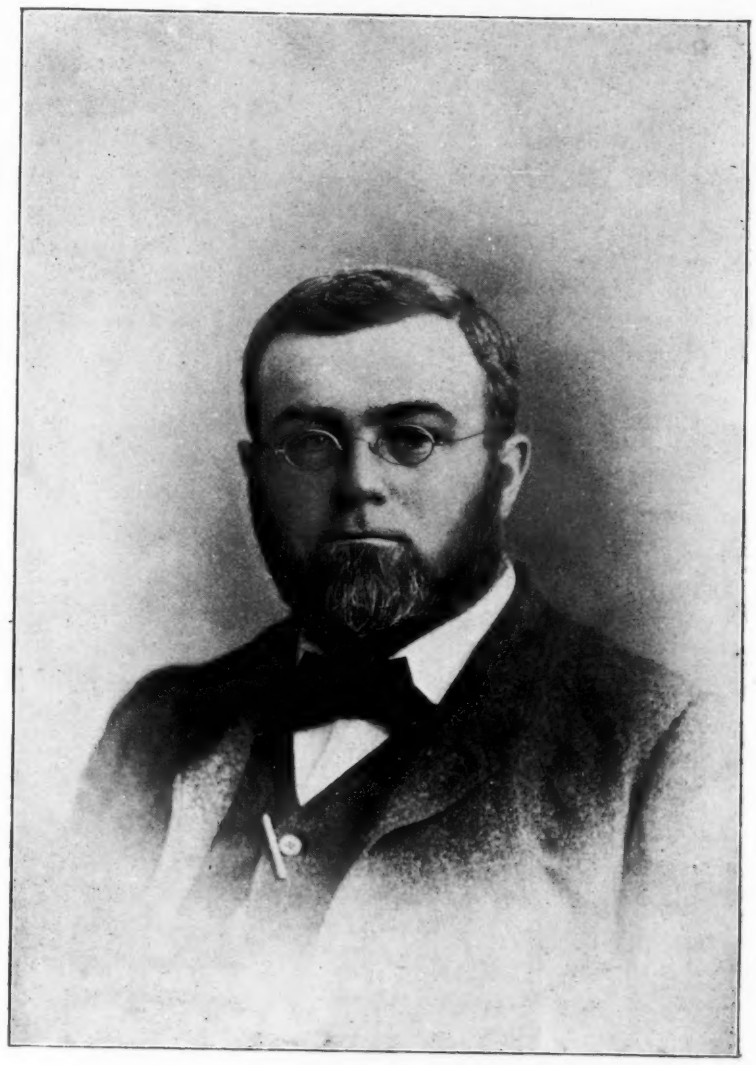
1. The tariff put the American steel industry on its feet.
2. The tariff enabled American manufacturers to perfect their processes so that they now turn out the finest steel in the world.
3. The tariff has put the United States at the very front among the steel-producing nations.
4. The tariff, by assuring our manufacturers a home market, has given them encouragement to enter foreign markets on the strength of the superiority of their product alone.
5. Because of the tariff, we pay the highest wages on the face of the globe.

FUEL GAS IN BOSTON AND CHIGAGO.

Boston and Chicago are the latest cities to take up the problem of fuel gas. The Boston Gas Company have recently erected a plant embodying the latest improvements in the production of water gas from the cheapest grade of fuel. They propose to utilize one set of distributing mains which belong to the old company, and see whether the people on that line of the main care to use this gas for heating or cooking. The company is willing to spend some thousands of dollars to try it, and, if the public takes kindly to the idea, it is willing to spend some hundreds of thousands of dollars.

Just what prices will be charged is not stated, but in Chicago "50-cent gas" is being made and sold. The operations of the Mutual Fuel Gas Company began last week, with forty miles of mains, and a daily capacity of 2,000,000 feet, and 3,000 consumers. The price of 50 cents per thousand will probably be scaled for large consumers. These two experiments will be watched with general interest.

WE are in receipt of a circular, dated at Turin, Italy, August 31, and signed by M. Prosper Peyran, which may be of some interest to the iron trade. Mr. Peyran says that the Italian business-men are anxious to find means of direct trade with America, to the exclusion of the English middlemen, who have thus far controlled every avenue of communication, and who, our Italian correspondent asserts, by reason of their pretensions and enormous prices, seriously interfere with a liberal exchange of business. A direct commercial line is now projected between Genoa, Naples, New York and New Orleans, and since an Italian-American Exposition is planned in Genoa, in 1892, the Italian government intends to defray the cost of transportation, to and from that port, of all commercial exhibits that may be entered.



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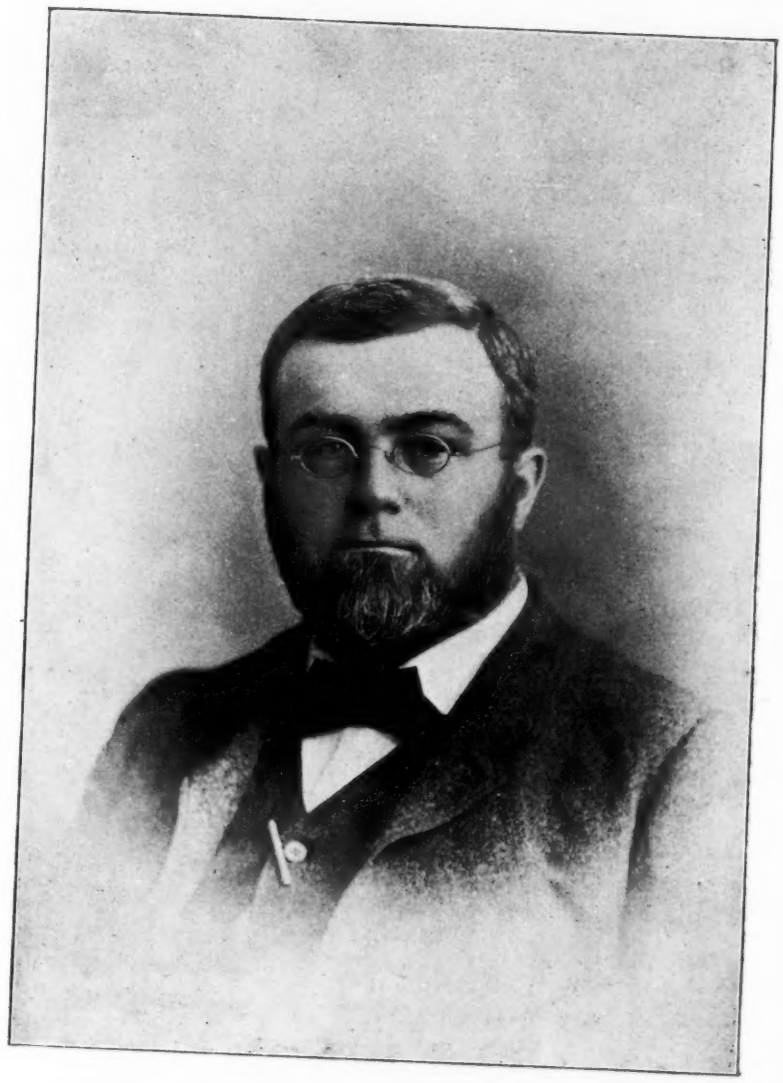

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ANOTHER American industry has been absorbed by English capital. A foreign syndicate has succeeded in securing control of the Magee Furnace Company, of Chelsea; the Smith & Anthony Stove Company, of Wakefield, and other smaller concerns engaged in the manufacture of stoves and furnaces in that vicinity. The magnitude of the investment may be judged from the fact that the net profits of the two companys named were for the year ending December 31, 1887, $158,243.43: year ending December 31, 1888, $172,457.42; year ending December 31, 1889, $188,029.19. The prospectus gives the name of the corporation as the American Stove and Furnace Company, and it is to have a capital of £250,000 in common and preferred shares, and £125,000 in 6 per cent. mortgage bonds.

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The Buckling of Iron and Steel Plates

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The genial, kindly face of Mr. Samuel T. Wellman, which adorns the supplement accompanying this issue of *The Iron Trade Review*, will be recognized by a wide circle of friends. Mr. Wellman needs no introduction to the iron and steel trade of this country and Great Britain, but a recent important change in his business relations makes appropriate this notice, and affords an opportunity of presenting his portrait to our readers.

Mr. Wellman comes of excellent lineage. To his father, Samuel K. Wellman, who was for many years manager of the Nashua (N. H) Iron Company, he probably owes his strong bent toward the iron business. As a boy, he was always around the works, doubtless often getting in the way, but quietly absorbing a great deal of practical information the meanwhile. Born in 1847, at Wareham, Mass., he removed with his father's family to Nashua when seven years of age. His schooling was obtained at Norwich University, Norwich, Vt., and his first practical education was had in the drafting room of the iron works at Nashua. Thus began a career that has been identified with some of the most important improvements in steel manufacture this country has ever witnessed, the recital of his business connections telling more eloquently than mere eulogy of his various achievements in metallurgy, which have placed him in the very front rank of steel experts in this country.

At the Nashua works Mr. Wellman built the first successful Siemens gas-heating furnace ever put in operation in the United States, working from drawings sent over from London by the inventor himself. The work suited the owners of the patents so well that they engaged him to represent them, which he did for two or three years, building and starting furnaces in different parts of the country. The experience thus obtained was invaluable, as it gave him an inside view of many steel works that he could not have had in any other way. After terminating the engagement with his English employers, he built crucible steel melting furnaces for the Chrome Steel Works, in Brooklyn, N.Y., and then, at the Bay State Iron Works, in South Boston, Mass., he built the first successful open hearth steel melting furnace in this country, afterwards constructing a similar plant at the old works in Nashua.

In 1873 Mr. Wellman came to Cleveland to construct the now famous Otis Steel Works. The best comment on these works, and Mr. Wellman's connection with them, as general superintendent, is the fact that, with an original capital of $300,000, in fifteen years they earned nearly $6,000,000 and were sold by the original owners for nearly $4,000,000 more. Concerning Mr. Wellman's work in bring up the manufacture of steel up to the highest point of perfection, it need only be said that the product of these works has long been known not only throughout this country but abroad, as the *ne plus ultra* of American steel.

Mr. Wellman left the Otis works about two years ago, and soon afterward accepted the position of consulting engineer of the great Illinois Steel Company, of Chicago. A few months ago he interested himself in the reorganization of the Chester Rolling Mill Co., at Thurlow, Pa., near Philadelphia. The capital stock of the corporation has been increased from $600,000 to $1,000,000; new and improved machinery has been added, and on October 1st the name was changed to the "Wellman Iron and Steel Company," with Mr. Wellman as President; Mr. Wm. G. Neilson as Vice-President; Mr. John P. Crozer as Treasurer, and Mr. Richard Peters, Jr., as Secretary. This important change will cause the removal of Mr. Wellman from Cleveland, greatly to the regret of our citizens generally; but though he will thus become a citizen of Thurlow, he still retains an active interest in several important local industries. He occupies an official position in the following well-known manufactories: The American Wire Company, of Cleveland; the Solid Steel Company, of Alliance, O.; the Spiral Weld Tube Company, of New York, and the Gobeille Pattern Company, of Cleveland. He is also a director in several of the local banks.

About twenty-five patents are the product of Mr. Wellman's ingenuity and ceaseless mental activity. The "Wellman Hydraulic Crane" is the best known of his inventions. The "Wellman Gas Producer" is also extensively used, but was not patented. His plate mill inventions have revolutionized the rolling of steel plates in this country, but the patents have brought him little in money. His charging machines bid fair to be extensively used.

Personally, Mr. Wellman is the most modest of men, devoid of display, reserved in manner, but most companionable among his friends. His home-life is exceedingly happy, and he is wise enough, in the midst of his many and distracting duties, to cultivate and enjoy it.

The Manufacturing Census.

The returns from the various departments of the census are slowly coming in and approximate results are being made public. One of the most important divisions, the enumerations in which will be watched with especial attention, will be that comprising the manufacturing enterprises of the country. The work is under the same chief of division now as in 1880, Frank R. Williams. The following table will be found of especial interest in this connection and for future comparison with the figures of 1890. It includes all cities which had over 1,000 "establishments of productive industry." It was compiled from a table in the census report of 1880, headed "Manufactures of 100 principal cities by totals:"

	Number of Establishments.	Capital.		Number of Establishments.	Capital.
Baltimore	3,683	$ 38,585,773	Newark, N. J	1,319	$ 25,679,885
Boston	3,665	47,348,384	New York	11,339	181,206,356
Brooklyn	5,201	61,646,749	Philadelphia	8,567	187,148,857
Buffalo	1,183	26,847,937	Pittsburgh	1,112	52,645,010
Chicago	3,519	68,836 885	Providence	1,205	27,177 006
Cincinnati	3,276	50,533,100	St. Louis	2,924	50,822 885
Cleveland	1,055	19 439,989	San Francisco	2,971	35,368,139
Louisville	1,108	21,767,013			

It will be seen that from the standpoint of capital Philadelphia stood first; but in the number of establishments New York had the lead. There was at the time a lively rivalry between those two cities for the first place.—[Iron Age.

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SAMUEL T. WELLMAN.

The genial, kindly face of Mr. Samuel T. Wellman, which adorns the supplement accompanying this issue of *The Iron Trade Review*, will be recognized by a wide circle of friends. Mr. Wellman needs no introduction to the iron and steel trade of this country and Great Britain, but a recent important change in his business relations makes appropriate this notice, and affords an opportunity of presenting his portrait to our readers.

Mr. Wellman comes of excellent lineage. To his father, Samuel K. Wellman, who was for many years manager of the Nashua (N. H) Iron Company, he probably owes his strong bent toward the iron business. As a boy, he was always around the works, doubtless often getting in the way, but quietly absorbing a great deal of practical information the meanwhile. Born in 1847, at Wareham, Mass., he removed with his father's family to Nashua when seven years of age. His schooling was obtained at Norwich University, Norwich, Vt., and his first practical education was had in the drafting room of the iron works at Nashua. Thus began a career that has been identified with some of the most important improvements in steel manufacture this country has ever witnessed, the recital of his business connections telling more eloquently than mere eulogy of his various achievements in metallurgy, which have placed him in the very front rank of steel experts in this country.

At the Nashua works Mr. Wellman built the first successful Siemens gas-heating furnace ever put in operation in the United States, working from drawings sent over from London by the inventor himself. The work suited the owners of the patents so well that they engaged him to represent them, which he did for two or three years, building and starting furnaces in different parts of the country. The experience thus obtained was invaluable, as it gave him an inside view of many steel works that he could not have had in any other way. After terminating the engagement with his English employers, he built crucible steel melting furnaces for the Chrome Steel Works, in Brooklyn, N. Y., and then, at the Bay State Iron Works, in South Boston, Mass., he built the first successful open hearth steel melting furnace in this country, afterwards constructing a similar plant at the old works in Nashua.

In 1873 Mr. Wellman came to Cleveland to construct the now famous Otis Steel Works. The best comment on these works, and Mr. Wellman's connection with them, as general superintendent, is the fact that, with an original capital of $300,000, in fifteen years they earned nearly $6,000,000 and were sold by the original owners for nearly $4,000,000 more. Concerning Mr. Wellman's work in bring up the manufacture of steel up to the highest point of perfection, it need only be said that the product of these works has long been known not only throughout this country but abroad, as the *ne plus ultra* of American steel.

Mr. Wellman left the Otis works about two years ago, and soon afterward accepted the position of consulting engineer of the great Illinois Steel Company, of Chicago. A few months ago he interested himself in the reorganization of the Chester Rolling Mill Co., at Thurlow, Pa., near Philadelphia. The capital stock of the corporation has been increased from $600,000 to $1,000,000; new and improved machinery has been added, and on October 1st the name was changed to the "Wellman Iron and Steel Company," with Mr. Wellman as President; Mr. Wm. G. Neilson as Vice President; Mr. John P. Crozer as Treasurer, and Mr. Richard Peters, Jr., as Secretary. This important change will cause the removal of Mr. Wellman from Cleveland, greatly to the regret of our citizens generally; but though he will thus become a citizen of Thurlow, he still retains an active interest in several important local industries. He occupies an official position in the following well-known manufactories: The American Wire Company, of Cleveland; the Solid Steel Company, of Alliance, O.; the Spiral Weld Tube Company, of New York, and the Gobeille Pattern Company, of Cleveland. He is also a director in several of the local banks.

About twenty-five patents are the product of Mr. Wellman's ingenuity and ceaseless mental activity. The "Wellman Hydraulic Crane" is the best known of his inventions. The "Wellman Gas Producer" is also extensively used, but was not patented. His plate mill inventions have revolutionized the rolling of steel plates in this country, but the patents have brought him little in money. His charging machines bid fair to be extensively used.

Personally, Mr. Wellman is the most modest of men, devoid of display, reserved in manner, but most companionable among his friends. His home-life is exceedingly happy, and he is wise enough, in the midst of his many and distracting duties, to cultivate and enjoy it.

The Manufacturing Census.

The returns from the various departments of the census are slowly coming in and approximate results are being made public. One of the most important divisions, the enumerations in which will be watched with especial attention, will be that comprising the manufacturing enterprises of the country. The work is under the same chief of division now as in 1880, Frank R. Williams. The following table will be found of especial interest in this connection and for future comparison with the figures of 1890. It includes all cities which had over 1,000 "establishments of productive industry." It was compiled from a table in the census report of 1880, headed "Manufactures of 100 principal cities by totals:"

	Number of Establishments.	Capital.		Number of Establishments.	Capital.
Baltimore	3,683	$ 38,586,773	Newark, N. J	1,319	$ 25,679,885
Boston	3,665	47.348,384	New York	11,339	181,106,356
Brooklyn	5,201	61,646,749	Philadelphia	8,567	187.148,857
Buffalo	1,183	26,847,937	Pittsburgh	1,112	52,645,010
Chicago	3,519	68,836 885	Providence	1,205	27,177 006
Cincinnati	3,276	50,533,100	St. Louis	2,924	50,822 885
Cleveland	1,055	19 439,989	San Francisco	2,971	35.368,139
Louisville	1,108	21,767,013			

It will be seen that from the standpoint of capital Philadelphia stood first; but in the number of establishments New York had the lead. There was at the time a lively rivalry between those two cities for the first place.—[Iron Age.

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The experience at this mill shows that the fine powdered ore and the ore going through a ¼ inch screen should never be allowed to fall directly on the separator, but should be carried near the separator by a belt on an inclined plane and attracted to the drum of the separator by the electro-magnetic force.

Up to present writing we have shipped in this season from this mill 8,000 tons of concentrates, and are now daily concentrating 180 to 200 tons at a cost, including crushing, hoisting material into mill-pockets, separating ore and loading it into cars, of 18 cents per ton. On some days the concentrates at this mill cost us only 10 cents a ton, delivered in the railroad cars, including all the above-mentioned items of cost.

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AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

The St. Paul Iron Mining Co. is the name of a new corporation organized at Upson, Wis. The incorporators include a number of local capitalists, and the work is in charge of Capt. W. H. Knowles. They have an option on sections 24 and 25, town 45, 1 west, between the Potato river and the Della option. They have been working there for some time and are now putting in heavier machinery. They have a test pit down 30 feet, and will begin at once on a working shaft and go down 150 feet, and then cross-cut. They have struck good ore and expect to develop a good mine.—[Ashland Press.

A high grade of ore has been struck on the Pence and Snyder property, on section 16. This is the Trezona and will make a splendid property.—[Ashland Press.

ATICOKAN RANGE.

"The greatest movement and interest in iron lands of late," said a leading assayer and mineralologist to a reporter of the Duluth *Herald*, "is the Aticokan range, just north of the boundary line. This range, as is generally understood, is a continuation of the Vermilion in your own State of Minnesota, and its ores are of the same general nature. It is a little astonishing, therefore, to see that the Anticokan range, which is now in just about the same stage of development the Vermilion passed in 1883, is attracting so widespread attention. This, I claim, is due to an attempt to boom the Aticokan, and the publication of news regarding it, while the Vermilion, even to this day, has never had its due notice. The Aticokan is but a continuation of it, and its ore is of just about the same grade and is uncovered to about the same extent as the Vermilion was about Tower. Prof. Pumpelly, C. R. Manhise and H. L. Smythe have gone out to examine the district, and will report on a number of properties for a big syndicate that in two years will probably be mining a couple of hundred thousand tons a year."

MENOMINEE RANGE.

At the Ludington the sinking of the shaft "A" from the 13th to the 14th level will begin next weeek. The work at the 13th has shown as fer as prosecuted a very satisfactory increase in the size of the ore body, and there is no doubt but that the recent developments at the east end of the mine will add greatly to the value of the property. At the old mine a fair state of things exists, and a good body of ore is opened and being mined. It is hardly probable that, in view of the many changes necessary, and the preparatory work done, the Ludington will much exceed its product of '89, but for '91 a very great increase may be looked for.—[Menominee Range, Iron Mountain.

The shaft at the Biard Mining Co.'s new Keyes Lake mine has reached a depth of over 20 feet, every foot of which is in almost clean magnetic ore. The metal continues to improve in quality, and is getting softer as greater depth is attained. Over 300 tons are now in stock, all taken out of the shaft, and nearly every bit of it is merchantable ore. The management intend to sink the shaft down 60 feet before drifting, and it is reasonable to believe that ore will be encountered every foot of the way. The indications now lead to the belief that the lower portion of the entire hill is almost a solid mass of iron ore. This is the only body of magnetic ore that has ever been found in this part of the country, and the product is pronounced by experts to be almost identical with that yielded by the Michigamme mines. By the 1st of November the fact will be proven beyond the shadow of a doubt that the promising exploration is surely and truly a mine.—[Florence Mining News.

The drift running north at the bottom of D shaft, at the Commonwealth, struck a body of hard, blue ore, last week, at a distance of 185 feet from the shaft, and at this writing is about 10 feet in the ore. A crosscut in the hanging wall of the "Davidson Pit," north, is about 22 feet in ore. Five wheel-scrapers are in use at the same pit, where stripping is in progress.—[Florence Mining News.

MARQUETTE RANGE.

Mr. Ed. Lobb has taken an option on the Delaware & Lackawana, adjoining the Buffalo on the east. It is reported that a body of ore has been opened sufficient to warrant the prediction that shipments of ore will be made from the mine before the close of the current season. This is the mine opened as the Mitchell and sold to the Delaware & Lackawana Co. for $300,000, the latter company abandoning it and surrendering the lease a few months after the purchase, and after spending many thousand dollars in exploratory work The conclusion that it was worthless was reached at an expense of fully $350,000. Mr. Lobb is confident that he will develop a profitable mine notwithstanding the dismal failure of his immediate predecessors.—[Negaunee Iron Herald.

The new vein of ore encountered several weeks ago in the American mine still holds a thickness of 16 feet, being very regular, and gives promise of developing into something of still larger dimensions. They have sunk upon this deposit a distance of 100 feet, and find it still holds out, and is of corresponding size and quality as noticed nearer surface. There are being drifts run in this direction from the lower levels of the mine, and the eastern end of the lense has been struck. In the drifts there is now shown 13 feet of ore. All interested in this property feel satisfied it will develop into a large mine that will repay them for all the expense they have been put to in developing it.—[Iron Ore, Ishpeming.

The Cleveland company is now getting some good Bessemer ore from its Lake shaft, and is mining more Bessemer ore than for a number of years past from the old Incline shaft.—[Florence Mining News.

The best ore in the world is now being taken from the new] shaft of the Lake Angeline to the east end of the lake. The Lake Angeline has for a number of years been getting the highest price for its ores of any mine in this country, and the new deposit is of even a higher grade than the ore hitherto placed on the market. There is merely a trace of phosphorus, and the ore assays, on an average, nearly 70 per cent. in metallic iron. The ore is the wonder of all metallurgists and the envy of all mining men.—[Florence Mining News.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, September 24th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Hortense	3,634	Pitts. & L. Angeline	208,366
Barnum	6,758	Humboldt	16,544	Prince of Wales	19,906
Buffalo	63,617	Imperial	22,222	Prout	9 947
Cambria	59,752	Jackson	92,596	Queen	81,927
Champion	184,033	Lake Superior	227,476	Republic	139,896
Cleveland	188,481	Lillie	27,669	Republic Reduction Co.	2,550
Cliffs Shaft	133,782	Lucy	38,678	Salisbury	71,382
Detroit	4,058	Marquette Ore Co	2,243	South Buffalo	101,893
Dexter	2,639	Michigamme	46,813	Volunteer	102,042
East New York	24,009	Milwaukee	24,603	Winthrop	68,224
Fitch	9,296	Negaunee	56 679		
Grand Rapids	5,245	New York	2,443		
Total, Marquette Range					2,048,270

MENOMINEE RANGE.

Aragon	24 273	Hamilton	16,443	Nanaimo	634
Armenia	21,816	Hersell	345	Norway	51,892
Chapin	505,503	Iron River	112,507	Paint River	42,278
Commonwealth	88,175	Ludington	64,490	Perkins	6,059
Cyclops	43,866	Mansfield	7,866	Pewabic	12,565
Dunn	104,622	Mastodon	52,446	Shafer	37,541
Florence	154,410	Mastodon South	845	Sheridan	595
Great Western	58,835	Millie	25,148	Vulcan	100,467
Half and Half	383	Monitor	14,059	Youngstown	32,054
Total, Menominee Range					1,579,918

GOGEBIC RANGE.

Anvil	25,402	Father Hennepin	9,634	Pabst	87,995
Anvil No. 2	6,716	Federal	12,160	Palms	20 737
Ashland	313,120	First National	105	Ruby	8,913
Aurora	174 786	Germania	29,221	Section 33	78,594
Brotherton	48,235	Iron Belt	81,650	Superior	21,988
Cary	60,363	Montreal	6,630	Trezona	38,343
Colby	161,834	Mt. Hope	48,420	Windsor	21,572
Davis	564	Norrie	631,707		
Eureka	20,747	Odanah	1,066		
Total, Gogebic Range					1,909,367

VERMILION RANGE.

Chandler	278,917	Minnesota Iron Co	423,798	Pioneer	7,681
Total, Vermilion Range					710,396
Grand Totals					6,247,951
To corresponding date of 1889					5,245,254

PROFIT SHARING AT ENGLISH IRONWORKS.

On Saturday morning the result was made known of the ballot taken the previous evening, of the workmen employed by the Thames Ironworks & Shipbuilding Co., limited, on the question of the adoption of the proposed scheme for profit sharing submitted to the men by Mr. H. F. Hills, the managing director.

The objects of the scheme were set forth—(1) to unite the interests of all concerned in the works, and to provide that the workmen shall participate in the prosperity of the company; (2) to prevent the friction, waste, and consequent loss from antagonistic views as to the relative claims of capital and labor under varying conditions of trade; (3) to emphasize the fact that in the Thames Ironworks it is in the power of workmen by individual exertions so to improve the work and economise the cost of labor as to enable the company to give them a share of the profits. The conditions were that after receiving £23 750 per annum as interest upon the shareholders' existing capital, the remainder of the profits should each year be equally divided between the company and their employes. Arrangements were made for the keeping of accounts to and for the election of a representative council of sixteen—eight by the company and eight by the workmen of the different trades. Men after six months were to be entitled to participate in the division of profit; the proportion earned by those not in the service six months was to be and form the basis of a provident fund to be administered for the men in a manner agreed upon. It was to be understood that the adoption of the scheme (outside the conditions) would leave the company and the men entire freedom in other respects, and the scheme was to be determined at 12 months' notice on either side. It was first published in April last soon after a strike of joiners at the yard, and was, when put to the vote, emphatically rejected. But the minority of the men, dissatisfied at the result, called the whole workmen together, and negotiations were apparently settled satisfactorily—the six months' service was altered to three months, and six months were fixed upon as the determining period—and the men, having taken the counsel of various trades, unionists, co-operative and socialistic leaders, it was hoped that the next poll of the men would decide to adopt the scheme, a great point being that when it was adopted the definite rules would be formulated by the representative committee, and be submitted to the directors. The poll was by ballot this time, and when the figures were announced they surprised even the more sanguine of the opponents of the scheme. For adoption 507 voted, against 1,206; 107 were neutral, and 15 ballot papers were spoilt. The votes were counted in the presence of the representatives of the men and the company.—[London Iron and Steel Trades Journal.

CAPT. CHARLES KING, who recently visited St. Paul and Minneapolis for the *Cosmopolitan Magazine*, has prepared for that monthly an illustrated article entitled "Twin Cities of the Northwest," which will prove interesting reading not only to the citizens of these two cities, but also to a great number of readers scattered throughout the country, who have watched with astonishment the marvelous growth of these towns. His article appears in the October issue, which will also contain the second part of a story by Julien Gordon, the *nom de plume* of one of New York's famous society women, a story which has attracted wide attention throughout the East.

THE FUTURE CENTER OF THE WORLD'S IRON PRODUCTION.

In view of the visit of five or six hundred of the leading iron and steel makers of Europe to the United States in October to spend a month studying the iron and steel making resources of this country, Hon. Edward Atkinson, of Boston, contributes to last week's issue of the *Manufacturers' Record*, an elaborate paper on the iron and steel interests of the world. Mr. Atkinson shows that this country is the greatest consumer of iron and steel in the world. Owing to the nearness of the ores and coal in parts of this country, as against the long haul or transportation of ores from Spain and Africa to Great Britain, and the increased depth and heat of the coal mines of England, he believes that iron and steel will be made in this country at as low a cost as in England, notwithstanding the higher wages in the United States. Mr. Atkinson believes that the world's consumption of iron and steel, which is now increasing so rapidly, will, for the next ten years, fully tax the productive powers of this and all other iron-making countries to keep up with it, and hence that while there may be fluctuations, prices on the whole must steadily tend upwards throughout the world. Basing his estimates on careful calculations made by himself, by Hon. Abram S. Hewitt and others, he holds that the present world's production of 28,000,000 net tons of pig iron, of which the United States will make during 1890 about 10,000,000 tons, must within the next ten years, or in 1900, be increased to not less than 44,000,000 tons, even at the lowest possible rate of increase, based on the rate of growth that has continued from 1856 up to the present time, while the rate of increase of late years, during which the demand for iron has so broadened, would show that the world will need and must have not less that 56,000,000 tons in 1900. These calculations are based on the normal rate of growth for the last fifty years, and do not take into consideration the possibility, and, in fact, the almost certainty of a greatly increased demand by reason of the opening up of Africa and Asia. On this point Mr. Atkinson says:

"Great continents are now being developed by the railway, and the construction of the railway leads to a continuous demand for iron and coal for use in other purposes. We may not attempt to forecast the increasing demand for iron which would ensue from the construction of the Trans-Siberian Railway, or of the railways which will soon open Southeastern Europe and Western Asia, or of the railways which may parallel the Euphrates. We need not now consider what would ensue when China begins to build railways, because China contains within its own borders iron and coal in abundance. We may not compute the demands of the great continent of Africa, which is now sure to be opened in every direction by the railway. Let us limit our own consideration for the moment to the development of the continents of North and South America, especially the latter."

This enormous increase in the demand for iron and steel will, Mr. Atkinson claims, require the utmost effort of production at every point where the raw materials can be assembled at reasonable cost, and where furnaces can be operated to advantage either upon the European or North American continent.

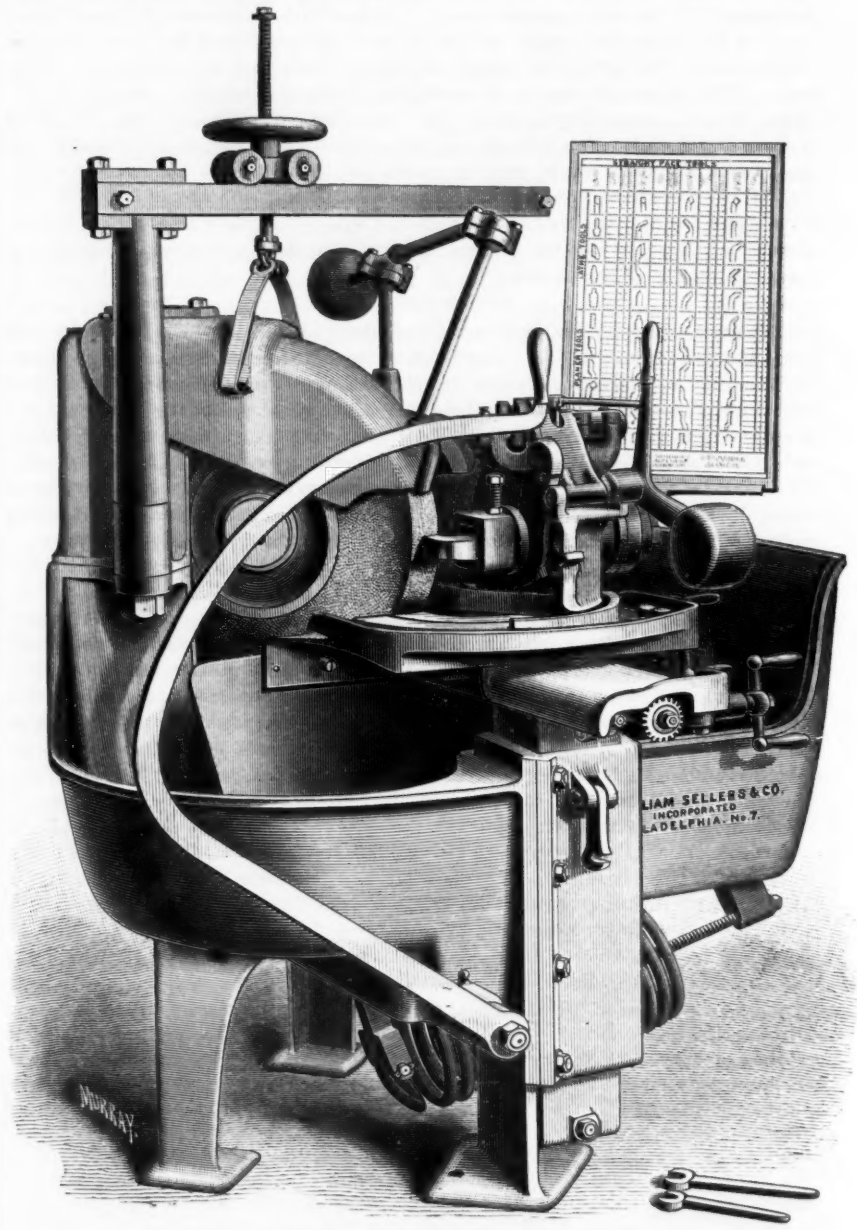
It is in the South, however, that Mr. Atkinson believes the world's iron and steel production will center, and this industrial advance "may," he says, "and probably will settle the race question. It will stop the contention in regard to the relative position of the black man and the white man in the Southern States, because social prejudices cannot stand against industrial forces. The causes of contention, of doubt, and of distrust, cannot fail to be almost wholly removed by the development of the iron industry of the Southern States, in which the black man will be a most important if not the paramount factor."

TOOL GRINDING AND SHAPING MACHINE.

Wm. Sellers & Co., of Philadelphia, Pa., have now perfected a machine, of which we give an illustration, for grinding and shaping all the faces of almost any kind of lathe, planer, slotter, and shaper tools. Tools brought direct from blacksmith shop, placed in this machine, have been ground and shaped in a comparatively short time to an exactness which to obtain would require the best effort, and test the skill of an expert tool maker in a shop equipped only with an ordinary grindstone.

The construction of the machine is simple, and it is very easily handled by a man of ordinary intelligence. The main features of the machine are as follows: A grinding wheel is mounted in a cast iron frame forming a large tank which receives the water used for flooding the tool in grinding. The machine is also provided with suitable shields which will prevent the throwing of water on working parts of the machine, the floor or the operator. The water for flooding the tool is supplied by a brass rotary pump, which is driven by a round belt from the machine countershaft. It is provided with a jointed and counterbalanced nozzle, which may be set in any position required, to deliver the water on the tool to the best advantage. Slide rests are provided, by which a verticvl and two horizontal motions at right angles to each other can be imparted to the tool-holding chuck. The side rests and chuck are carried upon a vertical slide of square section placed in front of the wheel and working in a covered bearing, and counterbalanced by a massive spring, so that the vertical slide may be moved up and down by the long lever which is operated by the left hand of the attendant, the object of this movement being to move the tool in a vertical plane up and down past the grinding surface on the tool. It is evident that if the tool were held at a convenient height and fed against the stone without other movement, the surface would conform to the surface of the stone, and as the bearing increased the cutting would become less rapid; hence, in grinding straight surfaces, the chuck and slide rest, etc., are moved vertically, as described, as well as horizontally. In grinding curved surfaces no vertical movement is given to the chuck holding the tool, but it is made to rotate to produce the curve desired. If the curve of the tool is not a circular one, but is such as shown in the diagram, then a "former plate" is required. Means are provided by which any sample tool, whether ground by hand or otherwise, can be used as a templet for grinding the "former plate" to be afterwards used for the reproduction of the shape of this sample tool. The preparation of necessary formers for a variety of peculiar curved shapes is not a matter of much expense, as these formers simply consist of small cast iron plates ¼ of an inch thick, and quickly shaped in the machine. The chuck which holds the tool can be rotated in two planes at right angles with each other, and the exact amount of rotation in either plane is indicated by graduated circles and verniers, so that any desired angle of tool or of clearance can be accurately obtained.

For grinding the curved face tools, the former plate is first selected as indicated by the table or diagram, and placed in the machine. Then the tool to be ground is placed in the swinging chuck with the base of the tool towards the left and pushed forward against the end gauge until the index-finger of this gauge points to the number given in the table plus the amount required to be ground off the tool, remembering that each graduation represents 1-32″ on the tool. Clamp the tool in the chuck; swing the chuck so that entire curve of the tool will rub against the end gauge, note the oscillation of the index finger and adjust the chuck by means of the handle on the left, until these oscillations are reduced to a minimum. The tool will then be in the best position for grinding. For grinding lathe, boring and chasing tools, planer



TOOL GRINDING AND SHAPING MACHINE.

hook tools, and slotting splining tools, the supplementary chucks, as shown in Figs. 1, 2, 3 and 4, are used and set to the angles given for corresponding straight tools.

The periphery of the grinding wheel is not at right angles to the flat surfaces of the wheel, but is formed so that in the section the grinding surfaces will form a V containing an angle of 90°. With this shape of stone a vertical surface perpendicular to the axis of the stone can be ground by moving horizontally the chuck with tool towards the center of wheel; then, without disturbing the tool or making any change whatever, a vertical surface at right angles to the former surface can be ground by moving the tool horizontally in a direction parallel to the axis of the wheel. A small crane is attached to the machine, by which the stone can be easily taken off its spindle or turned around when that becomes necessary. This crane is also useful and handy for lifting or taking out of the machine the supplementary chuck. We have no doubt as to the usefulness of this machine in many machine shops; it needs only to be seen to be appreciated. A diagram or table, of which we only give a portion, is furnished with this machine; the figures given in this table for the horizontal and vertical angles are those which have given the best results in the practice of Wm. Sellers & Co. These angles may be changed to suit the ideas of others without interfering with the construction or principles of the machine. Among the recent purchasers of this machine are: Fried Krupp Essen, Prussia; Otis Brothers, Yonkers, N. Y.; Link Belt Engineering Co.

Nicetown, Philahelphia, Pa.; West Milwaukee Shops. of C., M. & St. P. Ry. Co.; Crane Elevator Co., Chicago, and C.. B. & Q Ry. Shops, Aurora, Ill. Mechanical engineers are beginning to realize that an accurately ground steel tool is "the income gauge" of a machine shop. For further information address J. Wendell Cole, special agent., P. O. Box 152, Chicago, Ill., or P. O, Box 84 Columbus, O.

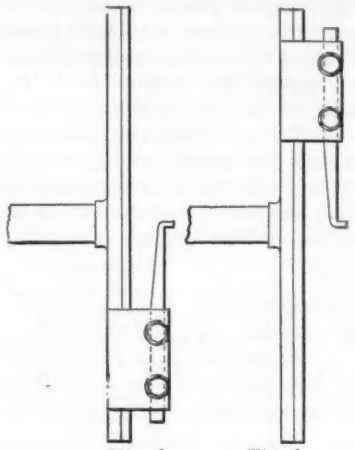


Fig. 1. Fig. 2.

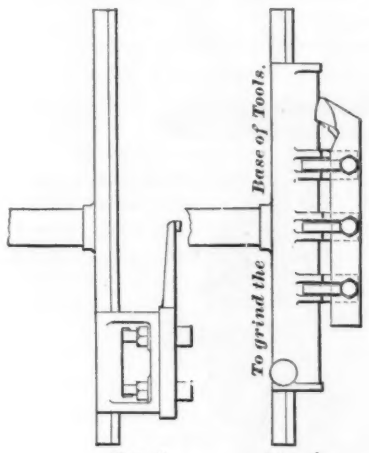
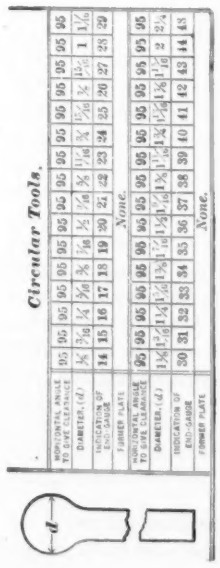


Fig. 3. Fig. 4.



CURVED FACE TOOLS.

LATHE

Kind of Tool	a (size of tool)	To grind Curved Face: Horizontal Angle to give clearance	Former Plate	Indication of End Gauge	To grind Top Face: Symbol of Tool	Horizontal Angle	Vertical Angle	Symbol of Tool	Horizontal Angle	Vertical Angle
Roughing Tool CR CL for Cast Iron	½″	98		4		93	114		93	66
	⅝″	98		6		92	113		92	67
	¾″	98		8		92	111		92	69
	1″	98	A	11	CR	92	110	CL	92	70
	1¼″	93		14		92	110		92	70
	1½″	93		17		92	110		92	70
	2″	93		20		92	110		92	70
Roughing Tool CR CL for Wrought Iron	½″	98		3		97	122		97	58
	⅝″	98		4		96	121		96	59
	¾″	98		5		95	120		95	60
	1″	98	A	8	CR	94	116	CL	94	64
	1¼″	98		11		94	116		94	64
	1½	98		14		94	116		94	64
	2″	98		17		94	116		94	64
Roughing Tool CR CL for Steel	½″	98		4		95	118		95	62
	⅝″	93		5		94	117		94	63
	¾″	93		6		94	115		94	65
	1″	93	A	9	CR	93	113	CL	93	67
	1¼″	98		12		93	113		93	67
	1½″	98		15		93	113		93	67
	2″	93		18		93	113		93	67

PLANER

Kind of Tool	a (size of tool)	To grind Curved Face: Horizontal Angle to give clearance	Former Plate	Indication of End Gauge	To grind Top Face: Symbol of Tool	Horizontal Angle	Vertical Angle	Symbol of Tool	Horizontal Angle	Vertical Angle
Roughing Tool AL AR for Cast Iron	½″	95		4		100	71		100	109
	⅝″	95		7		100	71		100	109
	¾″	95		11		100	71		100	109
	1″	95	A	15	AR	98	75	AL	98	105
	1¼″	95		17		98	75		98	105
	1½″	95		19		98	75		98	105
	2″	95		22		98	75		98	105
Roughing Tool EL ER for Wrought Iron	½″	96		5		100	64		100	116
	⅝″	96		6		99	65		99	115
	¾″	96		7		98	66		98	114
	1″	96	A	9	ER	98	66	EL	98	114
	1¼″	96		11		98	66		98	114
	1½″	96		13		98	66		98	114
	2″	96		15		98	66		98	114
Side Roughing Tool BL BR for Cast Iron	½″	95		12		95	75		95	105
	⅝″	95		14		95	75		95	105
	¾″	95		16		95	75		95	105
	1″	95	B	20	BR	95	75	BL	95	105
	1¼″	95		24		95	75		95	105
	1½″	95		28		95	75		95	105
	2″	95		32		95	75		95	105

STRAIGHT FACE TOOLS.

LATHE TOOLS.

Kind of Tool	Face	Angle of Clearance	Horizontal Angle on Grinding Machine	Vertical Angle on Grinding Machine
Finishing — Wrought Iron	Side a	4°	90	356
	Side b	4°	90	184
	End c	10°	80	90
	Top d	20°	110	95
Finishing — Cast Iron	Side a	4°	90	356
	Side b	4°	90	184
	End c	7°	83	90
	Top d	12°	102	95
Bent Finishing — Wrought	Side a	4°	45	354
	Side b	4°	135	185.5
	End c	10°	44.1	14
	Top d	20°	107	80
Bent Finishing — Cast Iron	Side a	4°	45	354
	Side b	4°	135	185.5
	End c	7°	44.5	9.7
	Top d	12°	98.4	81.4
Nicking	Side a	2°	90.3	358
	Side b	2°	90.3	182
	End c	10°	80	90
	Top d	0°	90	90
Bent Nicking — Right Hand	Side a	2°	45.3	357.2
	Side b	2°	135.3	182.8
	End c	10°	44.1	14
	Top d	0°	90	90
Left Hand — Bent Nicking	Side a	2°	135.2	357.3
	Side b	2°	45	2.8
	End c	10°	135.9	346
	Top d	0°	90	90
Brass.	Side a	14°	80	346
	Side b	6°	80	186.1
	End c	10°	75.9	45.6
	Top d	0°	90	90
Side. — Right Hand	Side a	15°	90	345
	End c	2°	59.9	3.9
	Top d	12°	69	102
Side. — Left Hand	Side a	15°	90	195
	End c	2°	120.1	356.1
	Top d	12°	99	78
Brass	Side a	14°	80	346
	Side b	6°	80	187
	End c	10°	75.9	45.6
	Top d	0°	90	90
Brass. Bent	Side a	14°	52.7	156.7
	Side b	6°	104.9	156.2
	End c	10°	60.5	191.5
	Top d	0°	90	90
Bent Side. — Right Hand	Side a	12°	45.9	339.2
	End c	2°	75.2	182.2
	Top d	12°	93.5	98.5
Bent Side. — Left Hand	Side a	15°	43.1	20.8
	End c	2°	75.2	357.8
	Top d	12°	93.4	81.5
Right Hand — Inside Bent	Side a	15°	133.1	339.2
	End c	2°	105.2	352
	Top d	12°	81.5	98.5
Inside Bent. — Left Hand	Side a	15°	133.1	200.8
	End c	2°	74.9	5.2
	Top d	12°	81.5	81.5
Right Hand — 60° V Thread	Side a	11°	60.6	347.5
	Side b	5°	60.1	185.8
	End c	15°	75	90
	Top d	1°	91	90
Left Hand — 60° V Thread	Side a	5°	60	354.2
	Side b	11°	60.1	192.7
	End c	15°	75	90
	Top d	1°	91	90
Right Hand 60° — V Thread	Side a	11°	108.5	322.8
	Side b	5°	105.1	185.4
	End c	15°	43	20.5
	Top d	1°	90.6	89.2
Left Hand 60° — V Thread. End	Side a	5°	105.7	341
	Side b	11°	104.8	191.2
	End c	15°	43	20.5
	Top d	1°	90.6	89.2
Right Hand — Square Thread	Side a	8°	90	352
	Side b	0°	90	180
	End c	5°	85	90
	Top d	0°	90	90
Left Hand — Square Thread	Side a	0°	90	0
	Side b	8°	90	188
	End c	5°	85	90
	Top d	0°	90	90
Right Hand — Square Thread	Side a	8°	45.6	348.7
	Side b	0°	135	180
	End c	5°	44.8	7
	Top d	0°	90	90
Left Hand — Square Thread	Side a	0°	45	0
	Side b	8°	134.4	191.3
	End c	5°	44.8	7
	Top d	0°	90	90

PLANER TOOLS

Kind of Tool	Face	Angle of Clearance	Horizontal Angle on Grinding Machine	Vertical Angle on Grinding Machine
Finishing	Side a	2°	90.1	358
	Side b	2°	90.1	182
	End c	4°	86	90
	Top d	7°	97	90
Splitting	Side a	2°	90.1	358
	Side b	2°	90.1	182
	End c	4°	86	90
	Top d	0°	90	90
Cutting Down. — Left Hand	Side a	6°	90	354
	End c	4°	79.3	20.2
	Top d	0°	90	90
Cutting Down. — Right Hand	Side a	6°	90	186
	End c	4°	100.8	341.2
	Top d	0°	90	90

DIAGRAM OR TABLE FOR TOOL GRINDING AND SHAPING MACHINE.

Pressure Used in Drilling Cast Iron.

Professor Breckenridge, of the university at Leigh, has, according to *Le Genie Civil*, made several experiments for the sake of ascertaining the pressure required to drill through cast iron. A cylinder was filled with oil and provided with a pump piston 10 square inches in area, to which was attached the piece to be perforated. The cylinder was also fitted out with a manometer and connected with the boring machine a Watt indicator, by means of which diagrams could be obtained, showing the changes of the pressure transmitted to the oil. Drills of one-fourth inch diameter were found to exercise a pressure of 181 kilograms, while for drills of ½, ¾, 1 and 1¼ inches diameter, the corresponding pressures rose to 407, 498, 566 and 815 kilograms.

PROFESSOR ELIHU THOMSON has recently devised a process for case-hardening iron or steel by means of the heat produced by the passage of an electric current. His process consists essentially in heating the object electrically and then applying to the metal so heated a surrounding envelope—either gaseous, fluid or solid.

SHAFT AND PIPE STRAIGHTENING AND FINISHING MACHINE.

The accompanying cut represents a new machine of the Brightman Machine Co., of Cleveland, for the use of rolling mills, pipe works and machine shops that make a specialty of turning shafting, etc. Its practicability and the improvement of its work on the old process of straightening under a press can be readily seen. The vises show the shaft held in position for passing through the machine. The rolls are attached by trunnions to the housings, they in turn being fastened to the large revolving center piece, driven by the main gear. The housings can be set at any desired angle, and are easily adjusted to suit any diameter from 1″ to 4½″. This machine not only straightens the shaft, but gives it a finish much superior to the old method of filing and grinding. The bar is fed through the machine automatically, the revolving of the center piece and rolls taking out all the kinks, and leaving it in a finished condition. The success of the patent milled shafting made by this company, and the large demand for the same, was the means of the consupply of this machine for their own use, in order to turn out work enough to ception their trade. Its capacity is 20 to 30 tons of rough or finished shafting in 10 hours. The builders have also in operation a machine for straightening square bars or irregular shapes—also angle iron. For further particulars address the Brightman Machine Co., Cleveland, O.

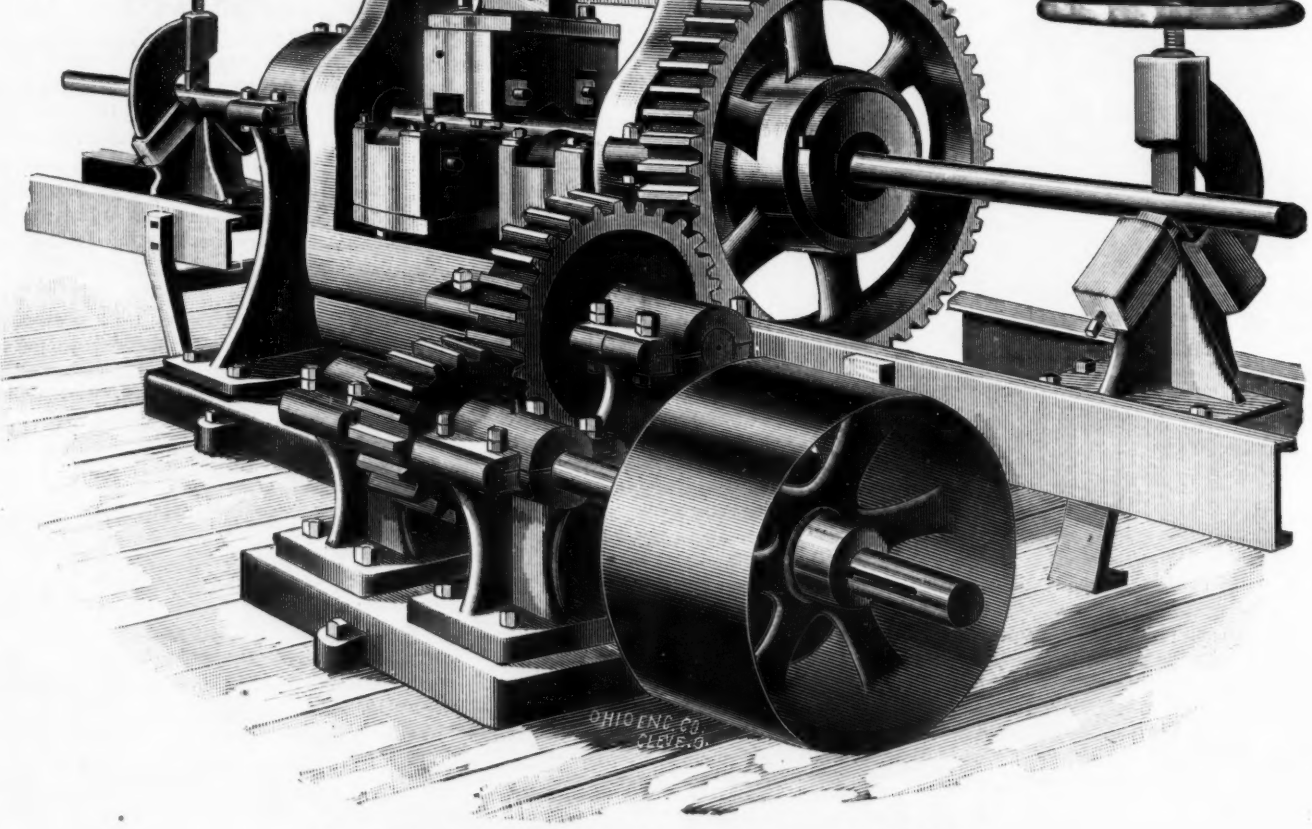
CARRYING CUBAN ORES INTO VIRGINIA.

Mr. Edmund C. Pechin writes the *Engineering and Mining Journal* as follows:

An enormous amount of twaddle has been going the round of the press in regard to the importation of Cuban ores into Virginia, and you yourself have an elaborate editorial on the subject, under date of September 13th. I am in a position to make an authoritative statement with regard to these ores. The Norfolk & Western Railroad Co. has not bought any ore properties in Cuba, and does not propose to import Cuban ores via Norfolk for smelting in furnaces along the line of its road. The Cuban company is not interested, either directly or indirectly, in the smallest degree in the purchase of the Sigua mines in Cuba, and in the developments now taking place at that point. Some parties interested in the securities of the Norfolk & Western Railroad are subscribers to the stock of the Sigua Iron Co., but they are in a very small minority. The company is purely a Northern company, controlled by Northern and English capital, and its intent is to open up large mining operations at Sigua, and to import the high grade ores found there for any market that may be open, either on the whole Atlantic seaboard, or at approximate points to the seaboard in the interior.

There is an independent scheme on foot to establish steel works at or near Norfolk, because that is a very desirable point for the landing of the Cuban ores in the United States, especially in view of the fact that Norfolk has direct and easy communication with the splendid cokes of the Flat Top region. I trust that this short statement is sufficiently specific to give the public a correct idea as to who control the Sigua mines.

A single word as to the subject matter of your editorial, touching upon the point of the use of the Cuban ores in Virginia. You are perfectly right in saying that Virginia has not opened up, on a commercial scale, any Bessemer ores. What she may do in this line is yet to be determined; but Virginia possesses enormous stores, beyond any peradventure, of Brown ores, admirably adapted for the making of forge and foundry iron. You understand as well as anybody the value of a high-grade ore as a mixture with lower grade ores for specific purposes, and it is quite within the range of possibility that Cuban ores, delivered at Norfolk, will be used to a certain extent at interior points in Virginia for the purpose of admixture with the Virginia ores for certain purposes. It will be extremely valuable for one use, and that is for a "fix." Virginia has no good "fix" ore. The rolling mills already in operation get their supplies of "fix" either from Northern New York, or from the Lakes, and necessarily it is very expensive. If they can avail themselves at Norfolk of a high grade Cuban ore, to serve as "fix," and at a price much below what it is now costing them, it is going to exercise a very important influence in developing the rolling mill business, all along the lines of the Virginia railroads.



SHAFT AND PIPE STRAIGHTENING AND FINISHING MACHINE.

Three-Dollar-and-a-Half Canadian Ore.

It is said that Canadian Bessemer iron ore, equal in quality to Lake Superior ore, could be laid down in Cleveland, O., for $3.90 per ton. The Philadelphia *Record* doubts this story, but adds: "If this be correct, it is folly to pay $6.50 and $7.00 per ton. The tariff duty of 75 cents per ton ought not to exclude the Canadian article."—[Monetary Times.

Mr. T. D. Ledyard, who controls a valuable Canadian Bessemer iron mine, says that the ore can be laid down in Cleveland, duty paid, for $3.90 per ton. American furnacemen should bear this fact in mind and investigate the property. The American duty ought not to exclude the Canadian article from the American market.—[Canadian Manufacturer.

The Cleveland *Iron Trade Review* prints the paragraphs given above under the caption "Is it True?" The *Mining Journal* risks the assertion that it is not. If Canadian ore equal in quality to that produced by our high grade Bessemer mines could be laid down in Cleveland for the price stated, the furnacemen who are now using the Lake Superior ores would long since have taken advantage of the saving that they could make by using the Canadian product. We have seen statements similar to the above in print at different times for years past, and yet the Canadian mines that are said to be able to lay down at Cleveland ore equal to that obtained from the best mines on Lake Superior for $3 90 per ton remain undeveloped. And that tells the whole story.—[Marquette Mining Journal.

Reduced Mileage via the the Pennsylvania Line.

Passengers between Pittsburgh and Cleveland who hold mileage tickets of the Pennsylvania Company's issue may hereafter make the journey in either direction by surrendering 130 mileage coupons instead of 150 as heretofore. To obtain the benefit of the reduced mileage, tickets should be presented for exchange checks in Cleveland, at the ticket offices, Union station, Euclid ave., or Weddell House block; in Pittsburgh, at the Union station, at 110 Fifth ave., or at Allegheny station. Long mileage will be collected if tickets are presented on trains.

THE project of ship railway to connect Lake Huron with Lake Ontario is being agitated, in lieu of the proposed ship canal. The distance between these two great lakes is only 67 miles.

INDUSTRIAL SUMMARY.

New Enterprises :—

J. F. Byers is building a machine shop at Ravenna, O.

The Tiffany Iron Works, at Tecumseh, Mich., has been incorporated with a capital of $50,000.

A. E. Rice and others, Chicago, Ill., have incorporated the Rice Machinery Co., to manufacture machinery.

The Bluffton Car Wheel Co. is the name of the stock company organized to build car-wheel works at Bluffton, Ala.

J. A. Whitman, Columbus, O., and W. S. and A. C. Whitman, Ironton, O., will erect a stove foundry at Glasgow, Va.

It is stated that J. H. Gill, of Raleigh, N. C., is investigating with a view to establish foundry and machine shops at Glasgow.

The Smithdale Iron Co. have been organized by J. P. Gay and others to build one or more iron furnaces at Lawrenceburg, Tenn.

The Belknap Motor Co. have succeeded the Belknap Water Motor Co., of Portland, Me. The new company have a cash capital of $50,000.

The Beaver Tube Co., Wheeling, W. Va., chartered with $1,000,000 capital stock, will build a new town and large plant near Lewisburg, O.

A company has been formed at Parkersburg, W. Va., for the purpose of making the Hastings steel wire nail, also for building the machines.

The Beedle & Kelly Co., at Muskegon, Mich., has been chartered for the purpose of manufacturing implements and machinery; capital stock, $100,000.

Articles of association of the Leland, Faulconer & Norton Co., capital $50,000, have been filed. The corporation will manufacture machinery and tools at Detroit, Mich.

The H. Dudley Coleman Machinery Co. has been incorporated at New Orleans, La., to succeed H. Dudley Coleman & Co., manufacturers of machinery, etc. The capital stock is $100,000.

A new company, known as the Pennsylvania Machinery Co., has been organized in Erie, Pa., for the purpose of manufacturing iron bolts, iron nuts, screws and other small articles of iron and steel.

The Collins Automatic Car Coupler Co. has been organized at Farmville, Va., with W. G. Dunnington, President, and J. R. Martin, Secretary, for the purpose of manufacturing the Collins automatic car coupler.

New bolt and nut works are projected at Anderson, Ind. The former superintendent of Anderson Bolt & Nut Works is reported to be at the head of the new organization, which will be started with a large capital.

The Kansas City Complete Combustion Boiler Co. has been incorporated at Kansas City, Mo., with a capital stock of $100,000. The incorporators are : Thomas Toohey, Frank K. Moody, G. W. Palmer, Fred G. Palmer.

Albert Baldwin, Sr., Albert Baldwin, Jr., and N. Y. West, have incorporated at New Orleans, La., the New Orleans Agricultural Works, Limited, to manufacture agricultural implements, etc. The capital stock is $30,000.

A company, to be known as the Emerson Car Co., has been incorporated at Charleston, S. C., for the purpose of manufacturing A. S. Emerson's ventilating apparatus for railway cars. The capital stock is placed at $300,000.

A charter was granted at Harrisburg, last week, to the Boston Iron & Steel Co., of McKeesport, Pa., with a capital of $10,000. Directors, J. R. Jackson and Horace Crosby, of Pittsburgh, and J. B. Murray and A. Chanden, of McKeesport.

A number of local capitalists, headed by Mr. J. H. Ricketson, have organized a company for the manufacture of tin sheet and tinned plate plants complete. Negotiations are pending, and an option has been secured on the Pollock farm, above McKeesport, for a site for the proposed plant. The capital is $50,000.

A certificate of incorporation has been filed in New York by the Buffalo Railway Supply Co. for the purpose of manufacturing Cumming's railroad patent crossing and switch frog and other railroad supplies. The capital stock is $100,000, and Thomas J. Riggs, James Cumming, John J. Kennedy, Richard R. Ditzel, John J. Griffin, William P. Burns and Jonathan L. Slater, of Buffalo, are the trustees. The principal office is to be at Buffalo, N. Y.

Several Pittsburgh capitalists are interested in a company recently organized in Chicago, with a capital stock of $5,000,000, for the purpose of manufacturing structural iron. The site has as yet not been chosen, but lies between the selection of a location at Stickney, and one in South Chicago. The leaders in the enterprise are Messrs. Parkes & York, Phœnix building, Chicago. This is the same firm which erected the large furnace at Ashland, Wis. The company when in operation will employ about 1,500 men.

The following new companies have been granted licenses of incorporation by the Secretary of State of Illinois: A. W. Street's Stock-Car Line, Chicago; to construct and operate live stock and freight cars; capital, $3,000,000; incorporators, Arthur W. Street, I. J. Street and John F. Pershing.—Consolidated Electric Co., Chicago; to manufacture storage batteries; capital, $300,000; incorporators, Harry Lampert Jr., B. L. Langworthy and E. J. Dahurs.—Steamboat Wheel Co., Chicago; to manufacture patent steamboat wheel; capital, $200,000; incorporators, F. J. Reed, A. S. Reed and E. S. Reed.—John Ran Stove Manufacturing Co., Chicago; to manufacture stoves and other hardware; capital, $500,000; incorporators, John Ran, P. J. Dohm and N. F. Auw.—Landis Wax Thread Sewing Machine Co., Chicago; to manufacture and sell sewing machines and attachments; capital, $100,000; incorporators, Robert S. Fleming, Azel F. Hatch and F. S. Bennett.

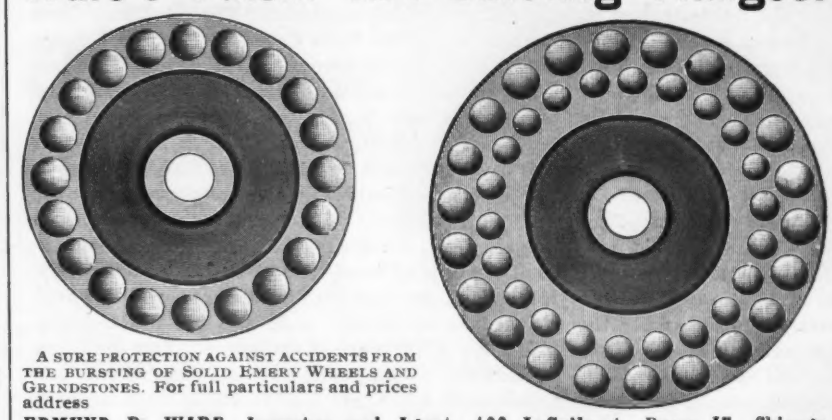
Enlargements, Additions, Removals, Etc.:—

J. W. Garratt & Co., St. Louis, Mo., are contemplating an addition to their foundry.

The Kingsbury Manufacturing Co. is erecting a machine shop at Beresford, Fla.

The Midvale Steel Co., of Philadelphia, Pa., is to erect a new casting shop

Ware's Patent Anti-Bursting Flanges.



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135x285 feet. There are two wings, each 50 feet long, and in the main building there will be a 50-ton traveling crane. The building is to be constructed entirely of iron.

Liddell & Co. are about to build a large machine shop and foundry at Charlotte, S. C.

The Batesville Iron Works, Batesville, Ala., will add a foundry to its machine shops.

The Jackson Foundry Association will erect a new building for its iron foundry at Jackson, Tenn.

It is stated that the Lawrence Iron Works, of Ironton, O., will move its rolling mill to Glasgow, Va.

The Gas Engine & Power Co., of New York, has increased capital stock from $100,000 to $150,000.

The Ross Valve Co., of Troy, N. Y., have increased their capital stock to $40,000, and will enlarge their factory.

The Duval Engine Works, of Zanesville, O., are reported to be about to move to Sherman, Tex., where they will establish a new plant.

The Henderson Steel Co., Birmingham, will probably increase its capital stock $100,000, to erect additional iron furnace, blooming train, etc.

The company operating the New Cumberland (W. Va.) Foundry & Machine Shops contemplate increasing its capacity by erecting a new building and putting in new machinery.

The Porter Foundry & Machine Co., of Allegheny, Pa., will rebuild their shops, recently destroyed by fire. Two new wings, 60x90 and 60x70 feet respectively will also be added.

It is reported that the Buffalo Lock Co., Buffalo, is intending to remove its entire plant to Basic City, Va., about Oct. 1, after which time it will be known under the corporate name of the Basic City Hardware Co,, with a paid up capital stock of $150,000.

The Swift Iron & Steel Works, of Newport, Ky., formerly owned by E. L. Harper, of the defunct Fidelity Bank, has been bought by the Ironton Steel Works Co., and will be rebuilt and enlarged, it is reported, until it will be one of the largest steel works.

Furnaces and Works Starting Up :—

No. 4 Furnace, of the DeBardeleben Coal & Iron Co., at Bessemer, Ala., was blown in on the 22d inst.

The nail factory of the Riverside Iron Works, at Wheeling, W. Va., which has been idle for some time, resumed operations last week.

The track bolt works of the Springfield Iron Co., Springfield, Ill., which were destroyed by fire July 12, have just been started up again. The entire plant has been thoroughly remodeled, and the facilities for turning out first-class work are greatly improved.

Fires and Accidents :—

The foundry of Samuel S. Bent & Sons, in Portchester, N. Y., was destroyed by fire on the 17th. Loss $40,000.

Beeson & Helmick's car wheel factory at Palatine, W. Va., Marion county, was destroyed by fire, Sept. 19, entailing a loss of $20,000, with $6,000 insurance. The factory was engaged almost exclusively on a patent self-oiling mine car wheel owned by Mr. Hilmick. The wheel, which had a big sale, was made nowhere else.

General Industrial Notes:—

The Aetna Machine Co., Warren, O., has just closed a contract with the Oliver Iron & Steel Co., Pittsburgh, Pa., for an engine to drive the machinery in their new plant which they are now building in that city.

It not generally known that Cincinnati, O., produces the largest amount of woodworking machinery in the world. Its name is famous in every clime for the variety and quality her manufacturers build. The Egan Co. now turn out over three hundred different styles, and can supply almost any want.

The Pittsburgh Steel Casting Co., of Pittsburgh, Pa., last week made what is probably the heaviest Bessemer steel casting ever cast in this country. It was a main shaft for the Riverside Iron Works, and weighs in the rough 21,000 pounds. The steel was blown by the superintendent, Mr. Stewart Johnston, and, from chemical and physical tests, the shaft is apparently a splendid piece of metal. It will be remembered that this company cast the famous Hainsworth gun, which, after a number of tests, was condemned by experts. The haft for the Riverside Co. weighs about 33 per cent. more in the rough than sthe gun casting.—[American Manufacturer.

THE SWEDISH IRON MINES.

The iron mines of Sweden are very much scattered. You meet with them in tolerable abundance as you pass along the Gota Canal, as it wends its way through the beautiful scenery; and as the accommodating steamboat proprietors have established halting places along the route, it is possible for any one, tourist or specialist, to secure a very hasty look round, or, if need be, arrangements can be managed for meeting the next boat. Then, further north, there are the Dannemora, the Sandvik, the Efkarles, and other works that cluster within 60 or 70 miles of the capital, while away northwards are the Gallivara deposits. There are many others; I do not pretend to give a complete list, nor would much be gained if I did so.

The composition of some of the ores of Sweden and Norway is noteworthy, as illustrations of combinations which are not found elsewhere, or found very rarely. For example, there is the lake ore, which, so far as I was able to learn, has nothing exactly like itself in any other part of the world. The dredging for this class of ore forms an industry which keeps a special class of men employed, mostly during the Autumn and as far into the Winter as work is possible. The ore is found in grooves, so to speak, at the bottom of the numerous lakes, and while it is generally of much less substance, it has been occasionally found in deposits of two feet thickness. That it is in some way formed by alluvial from the rocks surrounding the lakes, is proved by the fact that the ore does not cover the ground at the bottom of the lake, but is always found in crustations of limited width, varying from seven or eight feet upwards. The beds are worked until exhausted, and then left untouched for several years, during which interval another deposit forms. Among the archives of one of the obliging men I interviewed was an analysis of this lake ore, made, as I understood, by a great Swedish authority whose name he has forgotten. I give it just as I got it, viz.:

Metallic iron	47.30
Peroxide of iron	67.60
Oxide of manganese	1.45
Silica	7.80
Alumina	4.18
Lime	.47
Magnesia	.23
Phosphoric acid	.18
Water or organic matter	17.81

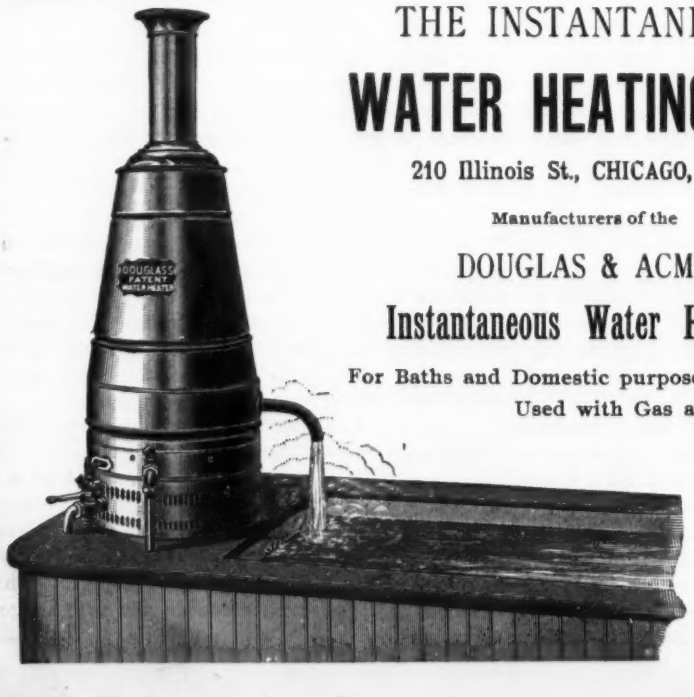
Magnetic ore, often in conjunction with iron pyrites, though mostly in minute traces, and hematite (always associated with magnetite) are found in Sweden, and in the samples I saw in one manager's office there were threads running through it of a material he called "schular"; what it was I cannot definitely say, but as I could best judge, it must have been chlorite. I found, however, by inquiry, that this feature of Scandinavian ore is found most generally in the Norwegian deposits rather than in those of Sweden.—[Correspondence London Iron and Steel Trades Journal.

Scranton Leads the World in Steel Rail Production.

More steel rails are produced within the city limits of Scranton than in any other city of the world. The annual product of the United States is about double that of Great Britain. They are the two great steel producing countries of the world. During the first six months of this year the production of steel rails weighing over fifty pounds to the yard was as follows:

		Tons.
1.	Illinois (Union, Joliet, North and South Chicago combined)	197,297
2.	Carnegie's	154,931
3.	Scranton	101,143
4.	Lackawanna	74,473
5.	Bethlehem	70,187
6.	Pennsylvania	62,469
7.	Cambria	52,795

It will thus be seen that the total production of Scranton was 175,616 tons, every ton of which was manufactured within the city limits, while two of the Illinois Co.'s mills are located miles away from the city of Chicago. The Carnegie mills are miles away from Pittsburgh. Allowing Chicago all it claims, Scranton still occupies second place in total production. It is therefore no wonder that we are deeply interested in all that concerns the steel rail trade. During the last two years of depression in the coal trade the rail mills in this city worked night and day, and kept between 5,000 and 6,000 employes at work. We all know what we owe to our manufacturing industries the past two years. —[Scranton Truth.



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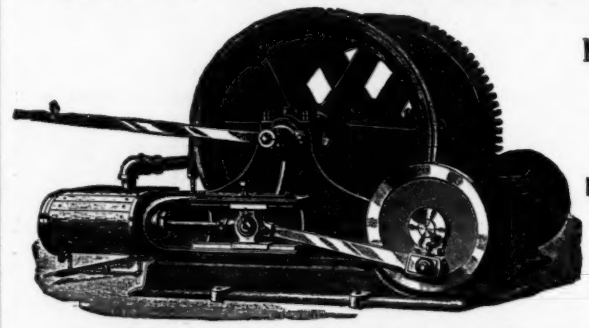

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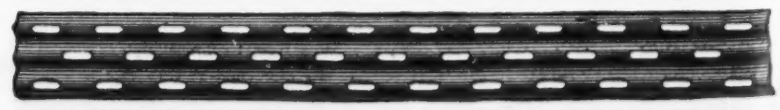

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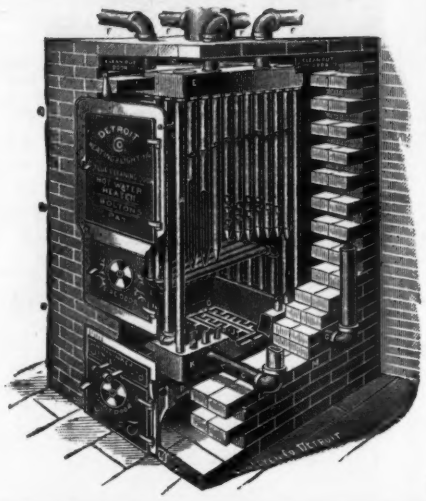

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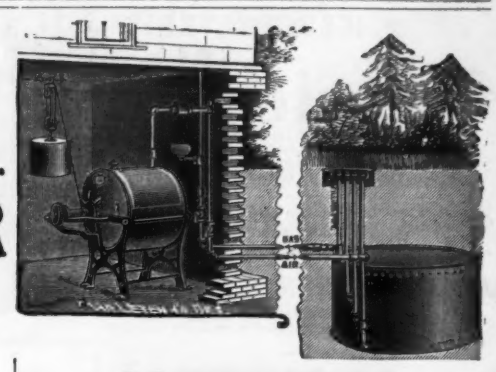

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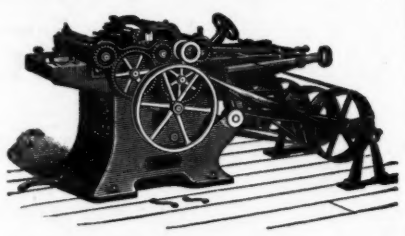

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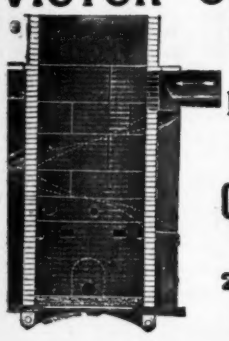

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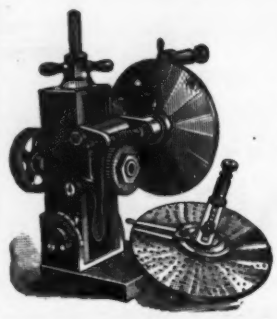

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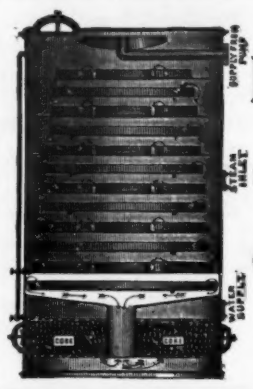

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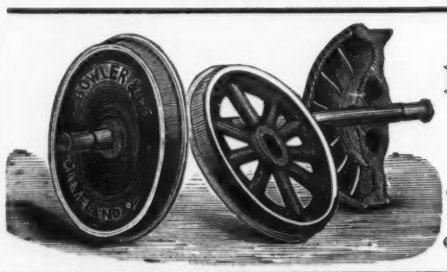

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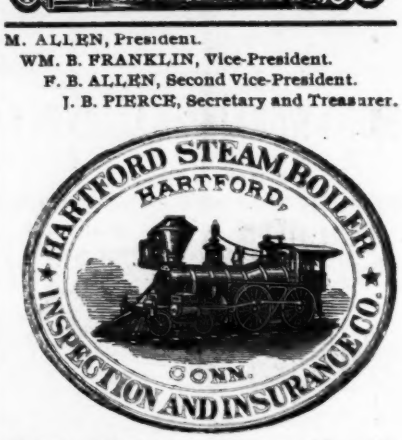

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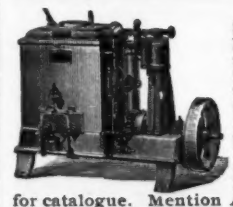

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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 50@17 00; Southern Coke No. 2 Foundry, $16 00@16 50; Southern Coke No. 3 Foundry, $15 50@16 00; Southern Coke No 1, Softeners, $16 00@16 50; Southern Coke No. 2, Softeners, $15 00@15 50; Ohio Silveries No. 1, $18 25@18 75; Ohio Silveries No. 2, $17 25@ 17 75; Ohio Strong Softeners No. 1, $19 00@19 50; Ohio Strong Softeners No. 2, $18 25@18 75; Lake Superior Charcoal Nos. 1 to 6, $20 00@21 00; Tennessee Charcoal No. 1, $19 50@20 00; Tennessee Charcoal No. 2, $19 00@19 50; Southern Standard Car Wheel, $22 00@24 50; Tennessee Standard Car Wheel, $19 50@20 50.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 25@15 75; Hanging Rock Coke, No. 1 foundry, $17 50@18 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 50; Tennessee Charcoal, No. 1 foundry, $17 50@18 50; Hanging Rock Charcoal, No. 1 foundry, $21 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 25@13 75; Standard Southern Coke, mottled, $12 00@13 00; Cold Short Southern Coke, grey forge, $13 00@13 50; Strong Ohio Neutral Coke, grey forge, $15 50@16 00. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $22 50@23 00; Tennessee Car Wheel, $20 50@21 50; Lake Superior Car Wheel, $21 50@22 50.

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LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 75@16 25; Southern Coke No. 2, $14 75@15 25; Southern Coke No. 3, $14 25@14 75; Southern Grey Forge, $13 75@14 25; Southern Charcoal No. 1, $17 50@18 00; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $16 50@17 00; Missouri Charcoal No. 2, $16 00@16 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $21 75@22 25; Southern, $19 00@22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $20 50@21 00; Lake Superior (coke) Bessemer, $20 00@20 50; Katahdin (Maine charcoal), $24 00@25 00; Lake Superior Coke, Foundry, all ore, $19 25@20 75; Lake Superior Coke, Foundry Cinder Mixed, $00 00@00 00; Standard Ohio Black Band, $00 00@00 00; Southern No. 1, $16 50@17 00; Southern Gray Forge, $15 00@15 25; Jackson County (Ohio) Silvery, $19 00@19 25; Old Car Wheel, $00 00@00 00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 75@15 25; Southern Coke No. 2 Foundry $14 25@14 75; Southern Coke No. 3 Foundry $13 75@14 25; Grey Forge, $13 25@13 75; Southern Coke Silver Grey, $14 00@15 00; Southern Charcoal No. 1 Foundry, $17 50@18 50; Southern Car Wheel, Standard brands, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 00@17 50; No. 2 Foundry, $16 00@16 50; Grey Forge, $15 25@15 50; White and Mottled, $14 00@14 50; Warm Blast Charcoal, $19 00@22 00; Cold Blast Charcoal $24 00@29 00; Bessemer, $18 00@18 50

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Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 95
4½ to 6 by ⅜ to 1 inch	2 05
1½ to 6 by 1⅛ to 2 inch	2 35
1¼ & 1⅜ by ⅜ to ¾ inch	2 05
1 & 1⅛ by ⅜ to ¾ inch	2 15
⅛, ¼ and ⅜ by ⅜ to ½ inch	2 35

Round and Square.

1 to 1⅜ inch	1 95
2 to 2½ inch	2 15
2¼ to 3½ inch	2 45
3⅜ to 4 inch	2 95
4¼ to 4½ inch	3 45
4⅝ to 5 inch	3 65

Oval.

⅜ to 1¼ inch	2 35
⅜ to ¾ inch	2 55
½	2 75
¾	3 15

Half Oval and Half Round.

1⅛ to 3 inch	3 05
⅜ to 1¼ inch	2 65
⅜ to ¾ inch	3 25
½	3 45
¾	4 95

Heavy Band.

1⅛ to 6 by ¼ and 5-16 inch	2 15
1 to 1⅛ by ¼ and 5-16 inch	2 25
¼ to ⅜ by ¼ and 5-16 inch	2 45
⅜ to ⅝ by ¼ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1⅛, Nos. 13 to 15	2 95
15-16, 1 and 1⅛, Nos. 16 to 18	3 05
15-16, 1 and 1⅛, Nos. 19 and 20	3 15
15-16, 1 and 1⅛, No. 21	3 25
15-16, 1 and 1⅛, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¼ to 6 by ¼ to 3-16 in	2 35
1⅛ to 6 by Nos. 11 and 12	2 45
1 to 1¼ by ⅛ to 3-16 in	2 55
1 to 1¼ by Nos. 11 and 12	2 65
⅞ and 13-16 by ⅛ to 3-16 in	2 85
⅞ and 1 3-16 by Nos. 11 and 12	2 95
¾ and 11-16 by ⅛ to 3-16 in	3 15
¾ and 11-16 by Nos. 11 and 12	3 25
⅝ and 9-16 by ⅛ to 3-16 in	3 45
⅝ and 9-16 by Nos. 11 and 12	3 55
½ by ⅛ to 3-16 in	3 75
½ by Nos. 11 and 13	3 85

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 95
⅞ inch, " " " 13 and 14	3 15
¾ inch, " " " 11 and 12	3 25
¾ inch, " " " 13 and 14	3 45

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
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C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

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Tank	3 00
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Flange	3 70
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Above includes plates 90 inches wide.

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⅞ to 6 in	11½
¼ to 9-32 and 6⅛ to 7 in	12
3-6 in	14

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Casting Borings	9 00
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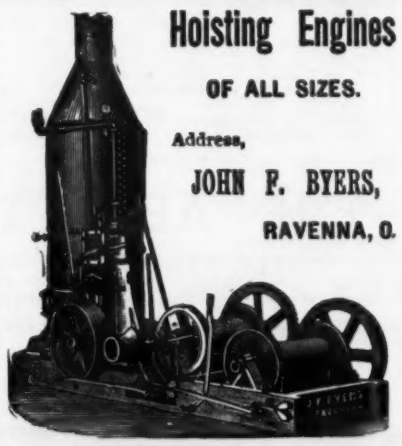

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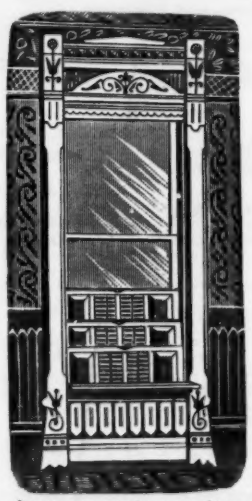

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Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1½".....dis 50&10
Morse Taper and Straight shank Larger than 1½".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills .....dis 55@15&5
Cleveland " " .....dis 55@35&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2¼c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@35&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	⅞	1
Square	8	7	5½	4¾	4	3½	3¼	
Hexagon	15¾	11½	8¾	6	5¼	5⅛	5	
Washers	9	8	7	5	4½	4¼	4⅛	

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 2&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls		21c@29c
No. 18 " " ¼ and ⅛ "		18c@28c
No. 36 " " ¼ and ⅛ "		16c@27c
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine)		11½c
3-Ply " 1lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 3

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Improved Screw Cutting FOOT AND POWER LATHES

Drill Presses, Shapers, Band, Circular and Scroll Saws. Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.

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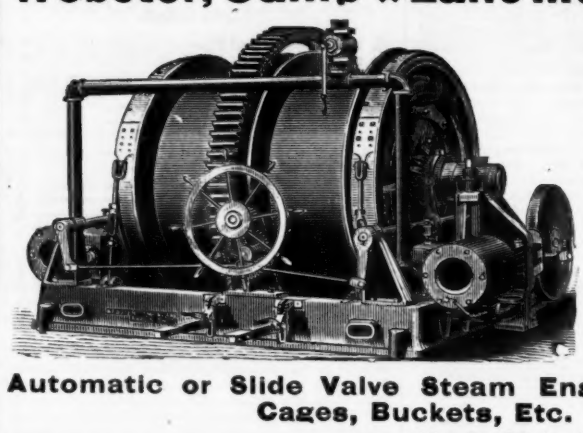
Webster, Camp & Lane Machine Co.



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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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Magnetic Concentration of Iron Ore.

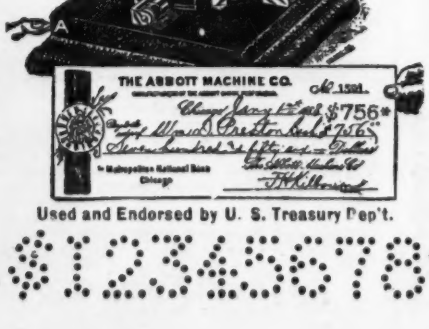
MONARCH SEPARATOR.

Non-Bessemer converted into Bessemer ore upon a commercial scale, economically. Capacity fifteen tons per hour. Samples treated without charge. Correspondence solicited.

H. E. COLLINS & CO., Agents,
MAGNETIC SEPARATOR CO., LEWIS BLOCK, PITTSBURGH, PA.

THE THOS. D. WEST FOUNDRY, CO.
CLEVELAND, O.
LIGHT AND HEAVY
IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
DUPLICATE WORK A SPECIALTY

PATENTED April 23, '89.



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CHECK PERFORATOR

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Investigate and learn the risk you assume by not using it.

PRICE, - $30.00.

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47 and 49 South Canal St.,
CHICAGO, ILL.

Pittsburgh Office:
531 Wood St.

All kinds of perforating stamps made to order.

Detachable and Roller
CHAIN BELTING,

MADE IN ALL SIZES OF
Malleable Iron and Steel,
DESIGNED FOR
Elevators,
Conveyors,
Drive Belts, etc.

For handling materials of all kinds.

Send for 1890 Illustrated Catalogue. Address

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183 East 1st Ave.,
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Standard Fiber-Ware.

Water, Dairy, Fire and Chamber Pails, Wash-Basins, Spittoons, Slop Jars, Mats, Etc., are

USED BY EVERYBODY

who knows its merits, because it is

Handsome, Cleanly, Durable,

and is made from Flax Fibre, in styles plain and decorated, white and colored, and is

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Engineers' Specialties. The Crescent Lubricating Compound and Automatic Grease Cups will effect a saving of 75 per cent. over oil Investigate their merits CRESCENT MFG. CO., Cleveland, O.

OIL ALWAYS BELOW BURNERS---BY USING OUR SYSTEM.
OUR SYSTEM IS INSURABLE IN ALL INSURANCE COMPANIES.
WE GUARANTEE INSURANCE WHEN PLANT IS INSTALLED ACCORDING TO OUR SPECIFICATIONS.

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425 MAIN STREET, SPRINGFIELD, MASS.

FORGING, WELDING, BRAZING, MELTING, ANNEALING, HARDENING, TEMPERING.

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C. S. BARROWS, 6 WADE BLDG., CLEVELAND, O. Also for Michigan and Indiana.
CHILION JONES, GANANOQUE, ONTARIO.
G. M. SMITH, LOS ANGELES, CAL.

SEND FOR CATALOGUES.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 70&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 70&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 70&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 70&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 70&5

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Eberts Bros., Detroit.	
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ℔ ton.....$30 00
Asphaltum, Fine G ade, ℔ lb.....08
Coal Tar Felt, 1 Ply, ℔ lb.....02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft.....1.85
Roofing Pitch, ℔ gal.....09

Chains.

Revised List.

Trace, 6¼-10-2.....℔ pair 1.03
Trace, 6¼-10-3.....℔ pair .92 } .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ lb 5¼@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber } 5 and Slop } 5X Commode } 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11¾ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 40
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 70&10
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$6...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

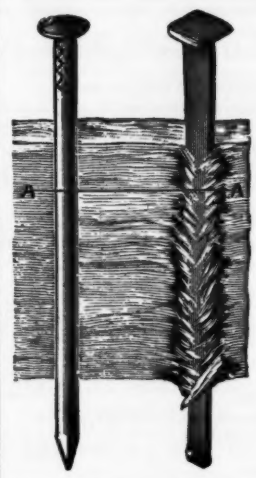
Squares.

Steel and iron } dis 75&10@80
Nickel plated } .....
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds.....dis 70&10&10
American carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds.....dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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THE GOBEILLE PATTERN CO.,

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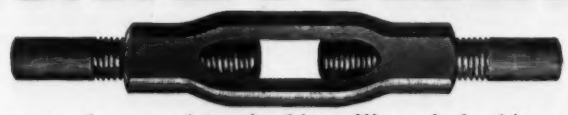
SEND FOR CATALOGUE.

TURNBUCKLES.



Wrought iron open hexagonal turnbuckles. The only buckle made that has a perfect wrench hold.

Made from charcoal iron.

THE CENTRAL IRON & STEEL COMPANY,
BRAZIL, IND.

Sole Manufacturer.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks.

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Upson Nut Co., Cleveland.... 16

Belt Holders—
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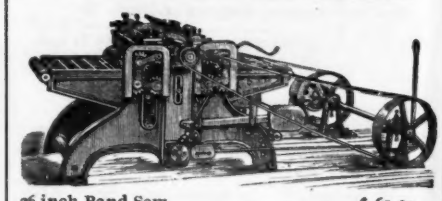

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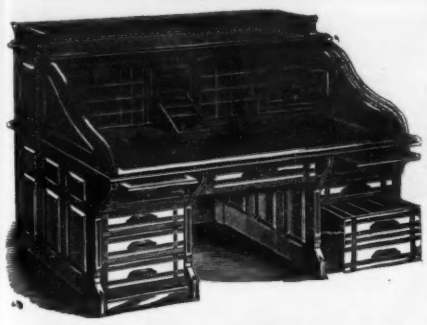

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Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

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Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
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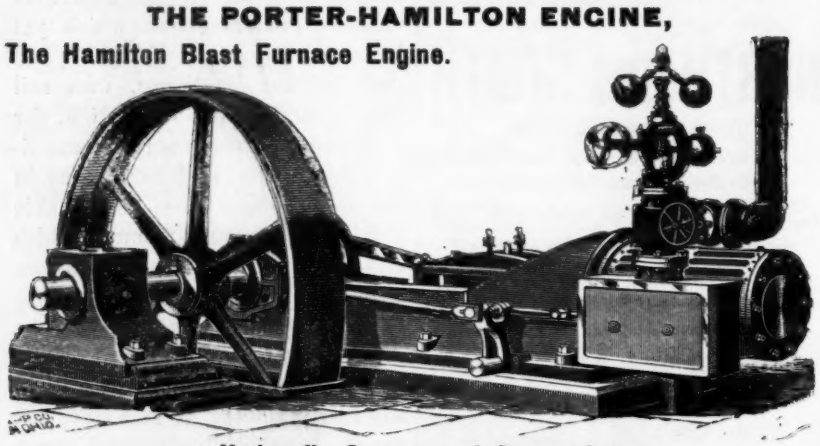
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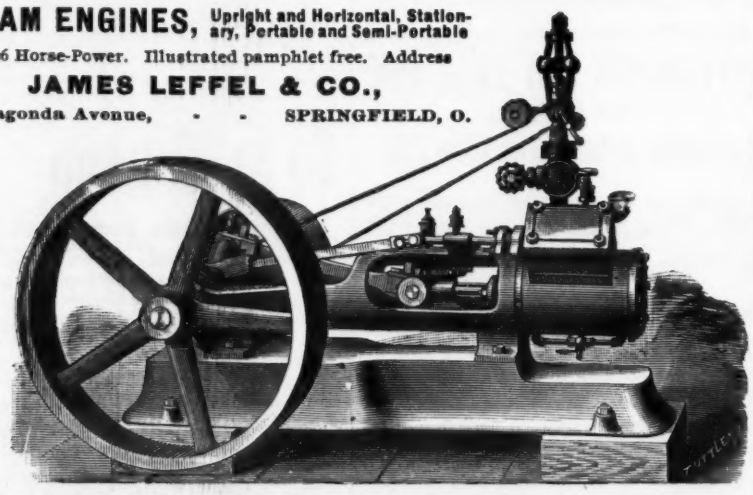
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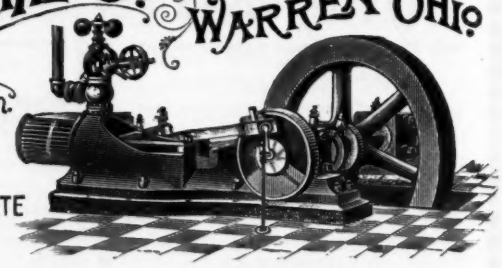
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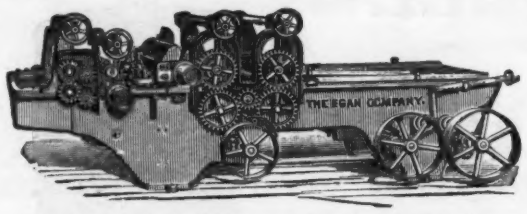

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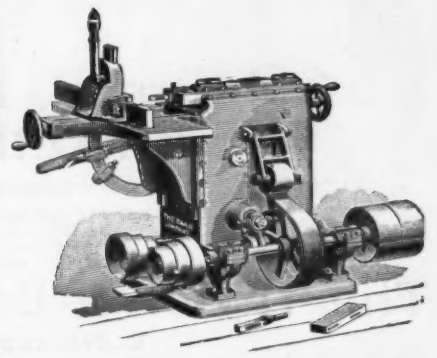

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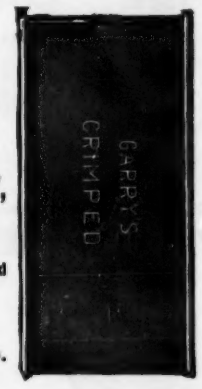

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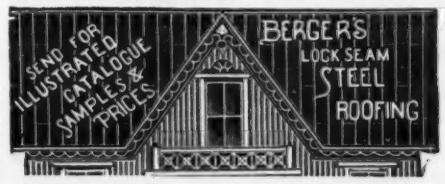

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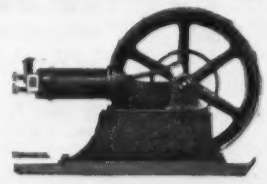

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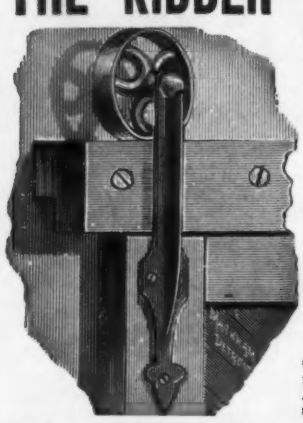

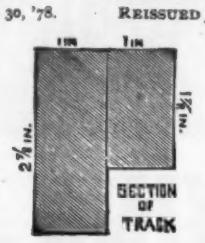

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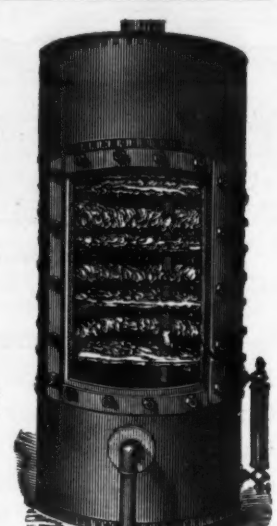

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